

MAN AND THE TERMITE



CASTLE OF HAMITERMES, MERIDIONALIS, N. AUSTRALIA
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MAN AND THE
TERMITE

by

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INTRODUCTION

LOOK down the escalator at Piccadilly Tube Station during a crowded hour. A motley mass of humanity moving down into the bowels of the earth, a lesser one ascending. But for the lack of uniformity in their component parts, these swarms of densely packed humanity would be indistinguishable from two streams of Working Termites flowing through sealed and covered tunnels to and from their work.

Other than this, at a distance, marked resemblance, and the fact that they are both soft-bodied, unprotected creatures, there is little similarity between these two manifestations of Nature—man and insect. Man, with one solitary exception of his kind—which we must go eastward to find—is concerned primarily with himself, his own affairs, welfare and spiritual salvation; self-preservation is instinctive within him, notably as regards his body, and, in a subordinate degree, what he is pleased to call his soul.

The Termite, on the contrary, and so far as can be judged, has no thought for himself; he is incredibly unconcerned with his own individuality. It may be said, indeed, that this parti-coloured, insignificant insect, which, except in soldier form, seldom attains a quarter of an inch in length, presents to those who care to study it, a living obsession of unselfishness. His life, of unknown and, it may be, indefinite duration, is devoted to the interests of others: to the good

of his fellow-creatures and his city: for the Power which urges him along the path of self-sacrifice is obviously concerned only with the welfare of the community under His care.

Man has many gods and more prophets. And if his clamant insistence upon the soundness of his various beliefs postulates more than a suspicion of lurking doubt of their efficacy, who shall blame him? *But, whilst envying, profoundly, the convictions of those who profess adherence to a faith which assumes that a Special Providence watches over their brief and ordinarily futile existences; disregarding as inconclusive the claims of the innumerable warring sects and, lacking, it may be, the faith which may move mountains—and does not—I find it beyond the bounds of reason to deny the obvious actuality of the Termites' God.*

For, if a lifetime spent among the multitudes of mankind in every quarter of the globe has vouchsafed to me no evidences of a loving, merciful, charitable, all-seeing and omnipotent Deity, I see, in the life of the Termite, nothing else. Half a century of study of that life has resulted in the conclusions set forth in this book.

Entomologically, it claims no value. Beyond a working knowledge of their classification I am not concerned with systems of terminology dealing with more than fifteen hundred species. At best, they are of comparatively recent determination and far from scientifically complete. The world is replete with uninvestigated forms of Termitic life. At the moment, the physiology of the race is so little under-

stood that there are in the Congo, Abyssinia and other parts of Africa, as well as South America, genera, sub-families, or, it may be, even families of Termites unidentified except by their diverse types of architecture. These range, in form, from peaked or battlemented castles to straight and soaring citadels, retort-shaped crucibles, sugar-loaf spires, perfectly fashioned tiny or gigantic mushrooms, or slender symmetrical shafts *twenty, thirty or forty feet high*.

One of the most highly civilised genera has been selected as typically representative of the Termite world, so far as generalisation is possible, partly because I have lived for many years in daily contact with it, but chiefly because it appears to me better fitted to illustrate the life and ideals of its kin—namely, *Termes natalensis* (Hav.) of the genus *Termes*, of the Royal Family of *Metatermitidæ* (Holm.) since promoted to *M. bellicosotermes*.

Other families including species of the marching, grass-cutting, harvesting, arboreal and surface dwellers call for more than passing notice—though one does not reasonably compare the ancient Greeks with the Tierra del Fuegoans. In point of fact there is more dissimilarity between the highest and the lowest forms of Termite life than between any two examples of *homo sapiens*.

Beyond the usual and expected apology for the sin of humanising an animal, no excuse is needed for making a fully-grown female member of the Worker caste, a Nymph and a Major Soldier the media through which the workaday life of their city is revealed.

Nor do I crave indulgence for endowing them with the faculty of speech. For, apart from a supposed sense of hearing, suspected only because of the varying sounds heard within the Termitary and certain sensory tactile nerves by which, at close hand, Termites are literally in touch with one another, science, of necessity, is silent regarding the means whereby they communicate with each other; their auditory nerves are yet unidentified. Nor have we any satisfactory explanation of the means whereby knowledge is bestowed upon the Worker caste to an extent which makes them, intuitively and personally, transcendental chemists, engineers, masons, architects, agronomists, and experts in social service.

We can only guess why the ability to exhibit these and similar acquirements should be denied to the soldier caste or why their accomplishments should be confined to familiarity with the duties of warriors, singly or together, traffic controllers, guards, sentries or patrols. Instinct, interpreted largely and according to popular science, as "inherited reflexes" explains nothing. Less daring than its upholders, as Darwin says, "I will not attempt any definition of instinct." But, as will be seen, neither the shibboleth of Natural Selection nor Evolution can apply convincingly to the problem of the Termite's unbelievable skill in the learned professions. "Instinct" most certainly cannot explain how orders are conveyed and instructions given in the Termitary.

Other than recognising, as I am constrained to do without demur, the God of the Termites, I have departed in no way from sober fact in recounting in

detail the daily life of the inmates, in accordance with the letter of the laws which obtain in a City peopled by members of the highest type. If I have made Cilla almost omniscient in matters pertaining to the upper world it is only because she acts as a mouthpiece to the Spirit which controls her life. And who shall gauge the depths of Its intelligence or set a limit to Its powers?

Certainly not Man. Supported though he be by all the superlative advantages of sun, light and sight, all the mechanism he has evolved, all the forces he has harnessed, he is not qualified to sit in judgment on a civilisation in some respects vastly superior to his own and one which he is yet far from understanding.

It must be borne in mind that the Working Termite indicated is utterly devoid of the sense of sight: he, or she, lives and works his or her wonders in total and impenetrable darkness; their cryptobiotic nature is such that they shun even the brief glimpses of the light afforded once a year by the exits opened to permit of the flighting of the winged nymphs.

For the rest, the Termite, as defined by Imms, is the sole representative of the Order Isoptera, "social and polymorphic insects living in large communities composed of winged and/or short-winged and/or wingless reproductive forms together with numerous wingless sterile soldiers and workers . . . metamorphosis slight or absent." They are in no way related to the true ants, which, with the exception of Man, are their bitterest enemies. Nevertheless, no

one with even an elementary knowledge of their history can fail to concur in the unqualified verdict of Smeathman, father of Termitology, "They will appear foremost on the list of wonders of creation."

CHAPTER I

IN THE BEGINNING

"Termites probably arrived in Silurian, making their age 300,000,000 years."

—Barrell.

TEN, a hundred, a thousand or a million years ago, two winged Termites, with dark, heavily pigmented, white-ringed bodies, and less than an inch in length, left their birthplace, creeping through a narrow opening, less than a pencil's breadth, into the open air. They were members of one of the most highly civilised families of their race and of the Alates caste, set free with tens of thousands of their fellows of both sexes at the annual exodus of the potential founders of new colonies.

Blown by a vagrant current of wind away from their scurrying comrades, they flew high and widely apart and so escaped all their enemies of the upper world; but they found each other at last.

Not necessarily by any of the five senses known to Man: for their faceted eyes were mere vestigial organs in which the nerves had long since perished, and they could not see. Nor by a sense of smell. For no evidence exists to the effect that Termites possess the faculty of scenting each other—or anything else; nor yet by sound, for auditory nerves are lacking in them, or, at least, if suspected they have not yet been identified. Nevertheless, either by means of a sixth

sense or by telepathy, or a system of vibrating air waves or by some force incomprehensible to us, they came together at last.

At once, as if the purpose for which they were furnished had been attained, two pairs of shining, iridescent wings separated at their sutures, fell from each and lay disregarded on the ground. The owners touched antennæ and took stock of one another.

They did not mate at once, these two venturesome representatives of a race which was old when the ichthyosaurus roamed the earth, because the Termites have none of the sexual frenzy of the Hymenoptera, and because, apparently, a decent reserve bids them postpone the consummation of their nuptials until they are settled in their new home.

Moreover, the female of the two was uncertain of the attractiveness of her companion, and in a society where sexual promiscuity is unknown it behoved her to be careful. Nevertheless she allowed him tentatively to touch and stroke her, turning her head from side to side as if to welcome his caresses, but keeping her body implacably rigid the while.

They stood for a space engaging in playful dalliance, until realising, perhaps, that there were no other aspirants in the neighbourhood, the nymph relaxed, quivered responsively to the touch of her suitor's antennæ and waved her cercus high in air. Then, figuratively hand-in-hand, they searched for a suitable spot in which to excavate their future home. After much blind groping, running hither and thither, and real or feigned indecision, they stumbled upon one at last.

They must have been well aware that their lives depended upon speedy effacement of themselves, for they set hurriedly, if carefully, to work, throwing the earth aside with frantic scratchings of their tiny feet in their anxiety to conceal themselves. Within an hour both had disappeared into the minute shaft they had sunk. But one knew from the movements of the grains of soil which were hoisted to the surface that, a few inches down, the bridal chamber was being constructed. When that was complete and duly sealed, the marriage would be consummated.

Leaving them for a space, one might well contemplate in its place the first of the many insoluble problems connected with the Termites' life. The caste to which the newly-wed couple belong are not Workers; they can know nothing of the trades and professions of that inspired class, in spite of the temporary shelter they have just constructed. Since their birth and during the last four months of their lives they have been fed daily by those same Workers, or rather, by the nurses detailed for that purpose in the home City. Not on raw cellulose, or humus, or even thrice digested matter—the Workers' usual food—but on delicate, cultivated fungus specially grown for the benefit of the young and conveyed to them by the mouths of their nurses. How then do the couple live? There is no food in the cell they have fashioned, and the bridegroom, the future king of the new colony, is inhibited from ever again facing the light of day. He cannot forage for sustenance for himself and his consort, even if it were not so: nor would the type of provender to which they are

both accustomed be available to him anywhere in the neighbourhood of his new home.

Yet, these highly nourished individuals live and thrive in the prison in which they voluntarily immure themselves during the term of gestation of the queen—a period of indefinite duration—and for the further three months, approximately, which must elapse before their first children attain the status of working adults.

No reasonable explanation of the riddle has been offered by any naturalist. The argument that the king, failing extraneous assistance, provides food for himself and his gravid consort is untenable. Normally, he does no work of any description and frequently cannot feed himself. Admitting the possibility, however, he would still have to act as nurse, remove and wash the first few hundred eggs laid by the queen, and build and arrange the temperature of the first hatching cells, without which the foundation of a new kingdom would be impracticable. For these are matters of actual fact unassociated with theory.

In any case it is unthinkable that the powers of the Workers should be bestowed upon the king for the space of a few short months, when neither before his mating nor afterwards can he employ them.

He and his consort are king and queen only *en titre*, and their titles are absurd misnomers. Neither has any power. She, if all things go well, will develop literally into the Mother of a kingdom, and he, freed from all material anxieties, will devote the remainder of his life to the food supplied him and

the propagation of his species—a life analogous in some aspects to that of a highly respected proportion of human society.

It is understood, of course, that once the first brood of the newly married couple is hatched and reared all things are possible. How they are accomplished prior to that remains to be determined.

* * * * *

A few years pass. From a depth no greater than a hand's span the queen has been transported to a scientifically designed and constructed chamber ten feet or so below the surface of the soil. It is domed and arched, ventilated, and warmed by artificial heat. Its entrances, one or two in number, are large enough to allow free egress to Workers and Soldiers, but so designed that neither the king nor queen can escape from it; virtually, they are prisoners for the rest of their lives. The walls and ceiling of the royal cell and the corridors leading to it are exquisitely fashioned and smoothly finished, sometimes with stercoral varnish, in the same way as cow dung is employed in a white man's rondavel. No projecting point or angle which might possibly injure the soft-bodied inhabitants is anywhere visible.

Surrounding her retreat, in which she will remain until her dying day, are the cells of the future fathers and mothers of other colonies, or victims of the annual holocaust the fates ordain, Alates of the primary, secondary and tertiary reproductive castes. The first, the true royalties, will eventually and surely take flight one and all, seeking their fortune in

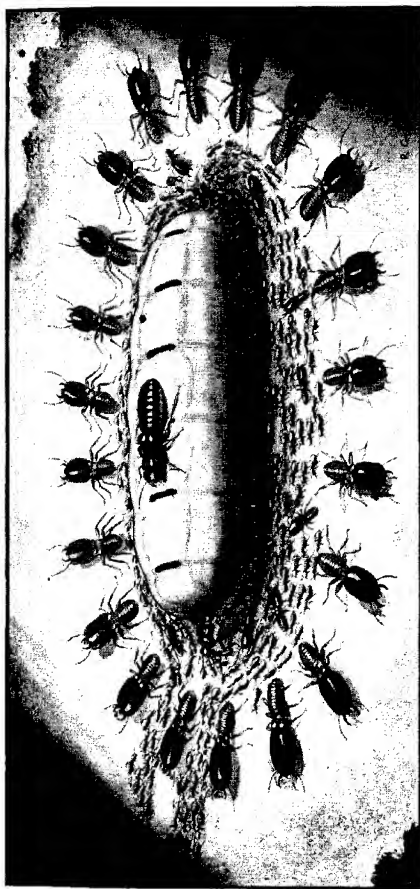
the outer world; it will be the duty of the other two castes to hold themselves in readiness to ensure the continuance of the community should death or disaster overtake the Mother Queen. Beyond these apartments are other sub-divisions of the City, to which reference will presently be made.

Lastly, if it be so ordained, there will arise on the site of the original excavation, on the same spot where the newly-wedded couple sank their first shaft, a lordly citadel of predetermined shape and symmetry. Inevitably, a portion of it will be used in the expansion of the City proper, but the objective of its minor towers will most likely be the correct and scientific ventilation of the kingdom.

* * * * *

Thus, in the course of time, in the black darkness of the low-domed Royal Cell, far down beneath the surface of the soil, the Queen of the Termites lies torpid, immobile and inert. Only the slight movements of her antennæ and the faint ripple accompanying the spasmodic expulsion of the stream of eggs pouring from her enormous body show her yellowish-white bulk as a living entity.

Many thousand times greater in volume than any of her children, she reclines on her hard, clay couch, oblivious of them and the busy life in which she is the central figure. So startling is the contrast between gigantic parent and puny children that any comparison between her and her progeny seems nothing short of fantastic. For they are a mere fraction of an inch in length and correspondingly meagre in



THE TERMITE COURT

The King and Queen of *T. Natalensis* (*M. Bellicosotermes*) in the royal cell, guarded by a detail of Major Soldiers. Minor Soldiers, acting as police and traffic controllers, are shown among the Workers employed as egg-carriers, massours and conveyors of food to Royalty.

(Drawn by R. Granger Barrett from actual specimens, by courtesy of the Natural History Museum, South Kensington, and from data supplied by the author, the holder of the copyright)

circumference; their colour ranging according to caste from the red-brown heads of the Soldiers to the dusky-white of the Workers.

The air of the cell is close and humid, redolent with the fragrance of new-mown hay; the only sound, a crisp crepitation which crackles incessantly throughout the Termitary. It comes from the myriad feet of the Soldiers and Workers who alone have access to Royalty and its apartment, cunningly hidden in the innermost recesses of the City. Around the Queen, as always, the Warrior guard, some thirty in number, stand immovable, in single rank and open formation, facing outwards at precise intervals, with their huge mandibles held at the ready. Later, they will be dismissed and march off in obedience to an order coming from nowhere out of the darkness. Then the relieving guard will fall in, take station and stand in readiness to defend their Queen or to repel any attack from invisible foes.

So they have stood, in turn, since the foundation of the City, thus will they mount guard over their charge, who is never left unprotected, until the end of its existence. It is our loss that we have no means of ascertaining in years, centuries or millenniums the age of a single subterranean colony or City. Nor, indeed, that of the dwellers therein, in their natural state.

At either end of Majesty's imposing presence is a wider interval between the guards. Through this opening ebbs and flows, in an endless tide, an incessant stream of Workers of both the Major and Minor castes, bringing food to their Queen, depositing

it within her insatiable mouth and returning, in close formation, to the outer cells or gardens for more. A second party many hundreds strong march to and from the ovipositor end of their Royal charge, by separate and well-defined routes, and await their turn. It is the duty of this fatigue party to clean with their antennæ each egg as it is laid, carry them in their mouths to the hatching cells and stack them there in symmetrical piles and layers. In such a manner that any confusion in their generation will be avoided and so that each individual egg can receive proper attention in due course. For there are skilled midwives among the Workers.

Still a third party, more numerous, energetic and tireless, hover around and about their Royal Mother. Standing on their hind legs, they stretch up as far as they can reach, to groom and massage her, to remove every little speck of dust from the Royal hide; others, climbing and clinging to it, pick up the moist matter she exudes freely and, it would seem, involuntarily. From its obvious attractiveness to those privileged to consume this exudate it is assumed to be a rare dainty. But in the Termitary nothing is wasted, and the honey-like flavour ascribed to this secretion may well be exaggerated.

To complete the personnel of this queer court we have, lastly, the King, who, mild, inoffensive and anything but kingly, skips and scampers over his gigantic consort. If he has other than marital duties we do not know them. But it may well be that he oversees to some extent the labours of the Workers, or those of the Minor Soldiers who move about

among the Workers, encouraging or chiding them with playful blows of their chitinous heads. Larger than they, but only a midget compared to his wife, the King literally dances attendance on, over, around and beneath her. When not thus engaged he, too, is fed by the hands or mouths of the Workers. But—and here is an anomaly—he, who has no warlike strain in his ichor, or ancestry, is driven to fury when man or beast invades the sanctity of the Royal Cell.

Darting hither and thither, to and fro, he seeks for the foe he cannot see but of whose presence he is well aware: or, reared upright, gropes in the air for the enemy he knows is threatening Her Majesty. And this fearlessness is strange indeed in an obscure insect to whom Man denies self-consciousness or any conception of an abstract principle or intelligence directed toward individual action.

CHAPTER II

THE UNDERWORLD

"Young ants are led about the nest by older inhabitants and taught their duties. They are said to be playful."

—Huber.

(Confirmed by Fabre.)

SO far as has been ascertained, the Worker Termite of either atrophied sex neither sleeps nor rests; the examination of hundreds of cities has resulted in nothing but negative results in attempts to verify the supposition that recuperation of energy is an essential of animal life.

It must therefore have been during her inspection duty among a labyrinth of passages and intricate corridors that Cilla, an adult Worker, paused beside a tier of eggs awaiting hatching in one of a long series of storage cells. She had been detailed as a nurse and her instructions included the safeguarding of these and the urgency of perpetual watchfulness.

Fifty days, as counted by Man, had passed since the incubation of this particular consignment had begun: but the eggs were packed so methodically that overlooking them was an easy task. Daily they had changed in hue and density, and now, shadows were showing through their semi-opaque coverings. The uneasy movements of one particular egg attracted her attention, and, as she watched it, the shell split and

a tiny head emerged, struggling to free itself from the soft, fractured envelope.

Signalling for help, Cilla seized it in her mouth, whilst other nurses, crowding round, drew away the ruptured shell-case; between them they pulled the baby clear of the slimy albumen of its late home.

"A fine child," quoth Cilla to her assistants; "even if it has come a little earlier than we expected. Another Worker, I see. And would have been a girl, too, if she had had any luck. Well, it's a change from all the Alates and Soldiers who have been born lately. Considering the thousands that have arrived during the last few days Higher Authority must be uncertain of our food supplies."

Her helpers agreed and set to work to groom the new arrival, now feebly stretching tremulous legs and waving uncertain antennæ. They removed every vestige of viscous stickiness and stroked her into cleanliness, while sanitary details carried the empty shell away from the precincts of the nurseries.

Thus was born Nympha, an apterous worker of the female sex: a member of one of the most advanced types of her race, of the species *Nataleensis*, of the genus *Termes*, of the family of *Termitidæ*, whose ancestry dates back to the Middle Oolite period of the world's history, fifty-odd million years ago. Or, for all we know to the contrary, back to the Carboniferous Age, two hundred million years earlier. In either case, a fairly respectable lineage.

* * * * *

For the first few days the new arrival lurched

helplessly about the neighbourhood of her birthplace in company with thousands of newly-hatched babies. They were of both sexes—Major and Minor Soldiers, Greater and Lesser Workers; amongst them, but holding themselves somewhat aloof from the throng, three other types of children, who, Nympha was well aware, were worthy of and receiving far more care and attention than was bestowed upon the apterous or wingless castes. Later, she would recognise and defer to them as the perfect insects, true kings and queens or potential reproductives of two inferior castes, whose fate it would be thereafter to hold themselves in readiness for any eventuality forecasting the need of a rapid increase of the population.

But, at the time, Nympha was more concerned with her own affairs, grooming herself and being massaged, begging food when hungry from the attendant nurses or anyone else, and, as she developed, shedding at frequent intervals, and with Cilla's assistance, her troublesome moults. Only the first gave her serious inconvenience, but, until the last, she could not overcome the lassitude and lack of appetite accompanying these distressing experiences.

"Why am I so uncomfortable inside?" she demanded of Cilla, at the beginning of her third instar.

"Because," was the reply, "the food you have eaten has bred another life, or, should I say, innumerable lives within you, which will enable you, when the time comes, to eat the hardest wood. Or, indeed, anything else."

"Your news is reassuring," remarked Nympha. "But why, at the moment, cannot I have some of that nice, fluffy food those other babies are being given?"

She indicated a group of pampered-looking nymphs clustered together apart from the others. She could not see them, as humans do, but she was perfectly aware that they were there; and devouring, with relish, some fluffy-looking stuff handed to them by obsequious Workers.

"You can," replied her mentor, "but these pets are of higher caste than ourselves. They may be the future kings and queens of other cities. Anyhow, they will be given the chance. They are sacrosanct and eat only of the best. Mushrooms, in point of fact, especially cultivated for their benefit. And for Her Majesty's."

"Some of them look exactly like me," grumbled Nympha, referring to the third class of reproductives, whose wings are only short pads. "How do you tell the difference?"

"We do not tell; we know. As, for that matter, we know everything else. After your fifth moult you also will acquire knowledge, subconsciously and without any effort of learning."

"Shall I not remember all that you are telling me now?" asked Nympha, signalling to a baby shambling by.

"I think not. The speck of matter known as your brain is incapable of remembering anything. You will just *know* things. And why did you call that passing child, may I ask?"

"That soldier boy? Because he had some grit on his back."

"Exactly, and you felt you ought to groom him. And how could you tell he was of the soldier caste? Even Man, the Lord of the Outer World, could not have done that."

"Oh, I just knew it," replied the neophyte, carelessly. "And what is Man?"

"Just a newcomer on the World above. But you will find out to your sorrow when you meet him. Meantime, you should know the law of the City; the knowledge may prove useful even while you are in the embryonic stage. Afterwards, and when you pass the fifth instar, brain or no brain, you will not be able to forget it; it will be your guiding star. Listen, then. Individual love and unvarying regard for the welfare of your fellow-creatures is the essence of the Law; the prosperity of the community is its first consideration. All your life you will feel the urge to help others. To deny it would be more than a sin; it would be sacrilege, blasphemy against the Spirit which rules us.

"Never refuse food to others even if you have to go hungry yourself; your first duty is to those who cannot feed themselves, the Queen and King, soldiers and nymphs, especially those of the future ruling castes. If enemies break into the City, you must join the soldiers in fighting them; should it be your lot to come to close quarters with an aggressor, never relax your grip though certain death be the result. You must remember that your life or death is a small thing compared with the well-being and

continuance of the community to which you belong. Its destiny should be your guiding star."

"And what is that?" asked Nympha.

"Only Higher Authority knows. But It would scarcely have permitted us to live for millions of years unless It had some specific end in view for us. Otherwise, there would be no sense in life. By the way, did I mention parasites? No? Or thieves? Well, there is little difference between them. Both are outside the Law. But wisdom to deal with them in your own good time will doubtless be vouchsafed to you."

"This is all extremely interesting and I could go on listening for hours. If I remember all you have told me I shall be better able to appreciate the knowledge which will presently be my portion. At the moment, however, I feel another moult impending. With your permission I will retire and suffer in silence. Assuming, dear Cilla, that you will assist in pulling off the wretched slough if necessary. There is just one more question. When I am fully fledged, as it were, shall I be assigned to one duty only?"

"That is a silly query and one, which, by this time, should be superfluous," replied Cilla. "You will not know from day to day, any more than I do, what your next task may be. Building, enlarging cells, nursing, egg-carrying, waiting on Her Majesty or the King, chemical or sanitary work, central heating or ventilation, sowing crops, fertilising the fields or just raiding the outer world for food are some of them. For myself, after all this easy nursing business

I expect to be told off for excavation work. Which, by the way, is no joke."

"But how can I learn all these jobs?" asked the novice.

"I appear to have wasted a good deal of time," answered Cilla. "Have I not told you? You don't learn them, you just do them. And now, although I have no eyes to shut—they would be useless in this gloom, anyhow—and never sleep, I am rather weary of your persistent chatter. . . . Ah, it's come. Orders to take all the Alates of the third moult to graze in the western mushroom fields. I must round up the little dears."

"Who said so?" demanded Nympha, hurriedly. "And who arranges these working-parties you talk about?"

"Idiot! Have I not said? They come through the air. Who arranges them? Why, Higher Authority, the Master, our Ruling Spirit. Or, if you prefer it . . . God." And, so saying, she went off on her own affairs.

Cilla was competent to speak of her own duties, no doubt, but she made no mention of an even more complex aspect of the life of the City, that of military control. For it includes the detailing, "numbering-off," mounting and changing of the Queen's guard: the appointment of patrol parties: the instant organisation of emergency troops in case of invasion: selection of control corps in charge of parasites and visitors: and those appointed to control the annual fighting, and, sometimes, the guard over foraging-parties. These are the duties of the Major Soldiers.

In their turn, the Lesser Warriors have to be chosen for police work, traffic control and street patrols. Thus, the interior economy of the City may be divided into four categories—the military, economic, domestic and technical. The first named three are plain for anyone to see; the last is not so easily explained.

For no man has the slightest inkling of how the different chemical processes of obtaining nitrogen from the air, turning carbohydrates into proteids and the opposing of manufactured oxygen to carbon dioxide are carried out by the Termite technician. Or which of them are responsible. These problems belong to the realm of pure conjecture.

CHAPTER III

THE GARDENS

"For the fungus, i.e. mushroom-gardens, to be successful the atmospheric conditions of the garden must be maintained with that degree of nicety man secures only with incubators and other more scientific apparatus."

—Dr. C. Fuller.

Division of Entomology, S. Africa.

IN close proximity to the Royal Cell, but beyond the hatching apartments, are the mushroom gardens, each in its separate enclosure. Thus, the work of carrying the eggs and subsequently feeding the newly hatched nymphs is a fine example of economy of labour, such as is often met with in the Termitary.

The science of agriculture is confined to the African and Indo-Malayan families of superior type; although others, in different parts of the world, are showing signs of a desire to improve their elementary knowledge of cultivation. *T. natalensis*, however, in their systemised method of laying out the enclosures, evince technical organisation of a very high degree.

First the building of the cell, with carefully wrought, though somewhat rougher walls than elsewhere, next the laying of the soil, all of stercoraceous origin, as are, largely, the cultivated fields of man—then the fertilisation and lastly the sowing of the

fungus spawn. So far there is no difficulty in following the process of this form of intensive cultivation, but now we come to a dead end. For we do not know the origin of the mycelium which serves as seed.

One authority, Bugnion, hazards a guess that "the mycelium is sown automatically by the worker Termites, since they feed on fungus-infected wood and the conidia pass through their bodies without injury." But the species of mushrooms grown in these subterranean gardens are unknown elsewhere; moreover, Workers might be detailed as gardeners whose interiors were devoid of conidia. Thus, labour would be lost. A sequel, which in the termitary, where no such mistakes are made, would be impossible.

The foresight which selected the garden sites, shut them off from the more public parts of the City and saw to the successive stages of their cultivation would certainly not leave the consummation of its intended purpose to chance. No, in this, as in innumerable other instances, we must adopt Cilla's explanation—there is no other.

Until recently the cultivators were known as "fungus-growers" much in the same way as they are still termed "white ants." My friend, the late Dr. Claude Fuller, who was one of the leading authorities on the Termite, remarks upon this phase of their industries as follows:

"As the term 'fungus-grower' is not very illuminating, these will be called 'mushroom-cultivators.' This is an appropriate name, and at once conveys the nature of a most astonishing habit—a

habit more complex and wonderful than the cultivation of any plant by man. Needless to say, this feature of their economy removes them far from other kinds of white ants. They propagate certain little mushrooms so as to provide an ever-present and flourishing supply of fresh and nutritious food for the juvenile members of their communities; and these miniature mushrooms have so far only been found in association with the nests of these particular white ants. Indeed, the association of white ants and the mushroom appears so intricate that it is not at all unlikely the lives of both are now so interwoven as to render the existence of one impossible in the absence of the other.

"The method of cultivation adopted is somewhat as follows: In the matrix of the soil cavities are hollowed out, and within these are built up beds of organic matter. This substance is neither more nor less than pellets of partly digested food—grass and wood—kneaded and moulded until the mass is shaped like a sponge, and, as with a sponge, presents a very great surface. Into the bed is introduced mushroom 'spawn,' where it grows luxuriantly. The surface of the garden first becomes clothed with a forest of short threads, like the nap on a cloth. Some of these come together as tufts, and the tufts grow into little white balls. Each little ball is composed of an uncountable multitude of microscopic cells, and these cells produce rods or chains of even smaller spore-like bodies. Upon these abnormal fruits, the young white ants browse, any loss being quickly made good by fresh growth.

"Thus, whilst one may see the little insects browsing and find chains of cells in their intestines, the white balls remain intact. This is the complex, and to us inexplicable phase of mushroom culture by white ants. There are other aspects. For the fungus to be successful, the atmospheric conditions of the garden must be maintained. . . . How this is successfully accomplished by white ants in an arid country is often a puzzle, but many an old mound adds its testimony to the truth that, just as crops perish in a drought, so do these ingenious creatures meet with adversity. There is another prosaic side to the matter, for the 'lands' are badly infested with 'weeds.' In every fungus garden various parasitic fungi are present, and with the slightest neglect, these spring into evidence and overwhelm the whole."

It may be added that specially chosen Workers are always in evidence, employed in keeping these injurious fungoid growths under control, nipping and pruning them as occasion arises.

* * * * *

And now, converging on their appointed grazing-grounds, the nymphæ of the early moults were being shepherded by elderly Workers. Behind them, again, stalked members of the Lesser Soldier caste, who swept up the stragglers like dogs driving a frolicsome flock of lambs. Presently, the gardens, both great and small—some no bigger than a half-crown piece—will be dotted with nymphæ, which, as Wheeler puts it, "crop the food bodies like so many snow-white sheep."

And, incidental to this shepherding of the young, from the time of the appearance of the first crop of edible mushrooms, and for ever afterwards, is found not the least of the marvels of the Termite world: one which illustrates an example of self-restraint rare in the animal kingdom. Although we know, from the avidity with which it is eaten, that this form of diet must be nothing less than manna from heaven to every caste of the community, the taboo which forbids it to all but the King, Queen and the young is strictly observed. It is denied even to the last when they are equipped with adequate protozoa in their interiors to enable them to deal with a cellulose diet. Exception is only made in the case of the winged Alates, who are consistently fed upon mushrooms, until the day of their departure from the City. Without it, in default of some other suitable form of diet, they could scarcely survive.

But no Worker is ever observed indulging in the sacred food, nor do they offer it to the Soldiers who, owing to the position of their enormous mandibles, are incapable of feeding themselves, but who would, one imagines, welcome the gesture. A Worker, carrying in his mouth a morsel of mushroom to the Royal Cell, will refuse it to a Soldier, who challenges, as is their custom, the carrier for refreshment.

So far as we know, the King and Queen prefer this food to any other. Hence, an attenuated stream of Workers plies between their apartment and selected gardens, bearing in their mouths sweet and succulent fragments of the coveted delicacy. To plant, weed and cultivate the fields: to watch the growth of the

crop, and then, greatly desirous of the fruits thereof, to pluck and convey it to another: such is the Workers' lot, and it is doubtful if self-denial can go any farther in the animal world.

To ensure this constant and essential supply of food in the Termitary postulates a certain form of combined action subject, in the first place, to a well thought out and definite scheme. It would be ridiculous to envisage it as the outcome of a single Termite's inspiration. To select a garden site and then call upon casual passers-by to aid in its exploitation, would be an impracticable procedure at variance with all his fellows' preconceived notions of the discipline of a well ordered government. For in the Termite life there is no duplication or overlapping of labour: no confusion of orders any more than there is visible hesitation in design or execution.

It is obvious, therefore, that someone must decide when and where additional cultivation is necessary, issue instructions, and decide, out of so many millions of inhabitants, on the labour force to be employed. For as methodically as one could expect from a perfect man-directed organisation do the Termites work: as systematically as the finest brains on earth could ensure are their objectives achieved.

There is a vast difference, however, between the methods of Man and insect as applied to the problem of foodstuffs. Man usually waits until an increase in the population of his kind is an accomplished fact before making provision to meet it. The invisible Master of a Termite City ordains a higher birth-rate justified by the plenitude of outside food of which

he is advised, and foresees the number and extent of the additional gardens and nurseries which will be required to cope with it. Just as He determines the exact proportion of the castes to be born, which will ensure the proper conduct of the City without undue preponderance of either Soldier, Worker or Reproductives.

Science has not yet furnished an alternative explanation of how this is done, nor have all the combined brains of investigators arrived at a plausible conclusion concerning another weighty problem. Besides the mushrooms of the fields, other fungi—whether Agaric or Xylaria is immaterial—are found in the Termites' dwellings, and these require not only a certain moisture content in the atmosphere, but a specified temperature. As indeed do the inhabitants themselves. Both essential properties are found in every Termitary. But no one knows how it is done.

Dr. Livingstone went so far as to suggest that the process of combining the oxygen of the atmosphere with the hydrogen of their vegetable food resulted in the production of the requisite degree of moisture within the City. Similarly, T. J. Savage ascribes the system of central heating within the Termitary to the circulation of hot and cold air throughout its myriad corridors. Both may be correct, theoretically, but neither explains exactly how the two processes are accomplished. Nor is it likely that anyone ever will, for to attempt to judge the Termite's life and labours by any human standard is a hopeless task.

* * * * *

Intent upon her charges, Cilla made no answering pass with her antennæ when an impatient Soldier, opening wide his mandibles, demanded food. Silently she gave him of her stomodeal store, and as he thanked her with a touch of his own antennæ and went off on his sentry rounds, she heard a well-known voice.

"And how did you come here?" she demanded, as Nympha shuffled up, breathing hard through her spirillæ.

"I was hungry and I heard a Voice telling me to come here and eat."

"One of these days you'll hear a false voice and find yourself in trouble," observed Cilla, dispassionately. "Well, now you're here you'd better help yourself. Better make the best of it, for you'll soon have eaten your last of this sweet stuff. No more of it when you're a Worker like myself, and your privileges come to an end."

"And what shall I eat then?" asked Nympha, pertly.

"Wood," answered her mentor. "And plenty of it whenever you are sent out foraging. When on City duty, of course, you'll have whatever is in the store-rooms or what the others give you. Then if you're lucky and are detailed to wait on the Mother, you'll get a taste of her honeydew, sometimes."

"I dare say I shall recognise it, but what is it?" asked the child.

"The stuff she exudes; the concentrated essence of this fungus. She eats so much of it that its sweetness comes through her body. But be careful of the

Lesser Warriors around her. They are always jealous and banging greedy people with their great heads."

"It sounds extremely interesting," remarked Nympha; "but can I never look forward to a change of diet?"

"Of course. If you are sent on a foray, as no doubt you will be, you may be directed to old boots, sacks, socks, clothing, millinery, saddlery, papers, stationery and such like. They are all to be found lying about the world above and are all very desirable."

"They seem very dirty to me," observed the neophyte; "and not at all like our beautifully clean City, where there is no rubbish of any sort."

"There is nothing dirty in Nature," said Cilla reprovingly; "although in point of fact we of the aristocracy are much more fastidious than some of our disreputable relations. Drepanotermes, for instance, an Australian cousin with perfectly dreadful manners. I must tell you about him some day. And Hamitermes, another nasty fellow. I have even heard rumours that they kill and eat each other."

"How very disgusting," said Nympha, with a shudder. "Why doesn't their God stop such shocking practices?"

"Our God, you mean," corrected Cilla. "I expect they have to work out their own salvation. You don't suppose our manners are what they were a million years ago? But as regards these Australian aborigines, I doubt if they are sufficiently developed for Him to take much trouble about them. Ah, I hear a signal given for me to take all your greedy little companions off the fields. The Soldiers will herd them back to

their apartments, but you had better come with me. I learn that I have to take part in a dealation job and it will do you no harm to watch it. Keep in touch with your antennæ and follow me."

So saying, Cilla led the way in the direction of the Royal Cell. Presently, she turned off without hesitating into one of the innumerable passages branching off from the main corridor.

Finally they came to a series of communicating chambers, in which a number of young, winged Alates were running to and fro as if to escape a fate which would for ever disbar them from seeing the light of the world above. Second form Alates, they were darker in colour and larger than Cilla, and embryonic eyes showed plainly in their heads.

Around them and about Workers pulled at their shining diaphanous wings, breaking them off at the sutures; sanitary Workers were already picking them up and bearing them off; others, more charitably inclined, were stroking and petting those victims who were apparently suffering from the wrench that had signalised the destruction of any hope they may have had of aerial adventure.

For these were the reproductives who would be held in reserve against any accident of old age or other disability which might cripple the reigning Queen; it would argue but a small degree of intelligence on the part of a Ruling Spirit, that would leave the fate of the City dependent upon a single life. Hence, in every termitary are found cells of these reservists ready at a moment's notice to take over the duties of reigning sovereigns. It

is a most remarkable fact that the egg-laying capacity of these secondary or tertiary Queens is considerably higher than that of the legitimate rulers.

Meantime, the shorn ones wandered disconsolately about the City, sadly conscious of the four short stubs showing where yesterday two pairs of glistening wings made them almost indistinguishable from the specimens of true Royalty, who passed them disdainfully on the roads. Henceforth, workless and stalled though they might be, their lives would be one long saunter; they would be looked upon as idle loungers until occasion arose for them to justify their existence.

Then and then only would a few be chosen and the others left until such time as a decree would issue and they, aged and useless, would be conveyed to the chamber of the dead—a halting-place, we are told, on the road which leads to the sarcophagi which are the stomachs of the living. But the evidence in the case of *T. natalensis* is purely negative; no Man has seen him in the act of eating his fellow creatures. But, curiously, in the world of the Termite, the halt, the maimed, the aged and decrepit simply are not found.

* * * * *

Quoth Nympha irrelevantly, "I seem to visualise a still darker being, with a rounded body, greater in bulk than either of us, who has just had his wings taken off. He seems very self-conscious and at a loss for something to do next."

"And I shouldn't wonder," replied Cilla. "It is a King you describe. An ambiguous title which will not

convey much to you, and only used in default of a better. He toils not, neither does he spin, and his activities, if and when employed, are directed to one purpose only."

"How dreadful," observed Nympha; "but isn't he a fighter too?"

"Of course he is: we all are."

CHAPTER IV

TERMITE TECHNOLOGY

"Difficult as it is to conceive the psychological condition under which such contacts are possible we may still get some help from the analogy of human action.

"When comparative psychologists take occasional inconsistency as proving the utter absence of intelligence (in animals) they are using an argument which would equally disprove the existence of intelligence in man."

—L. T. Hobhouse.

BY a fundamental law common to the physical world, Termites, no less than Man, require moisture; though averse to actual contact with water they are far from being immune to thirst.

It is true that a traveller once assured me that he had seen, in the neighbourhood of Lake Tchad, a stream of blind Termites descending the vertical side of a deep well to drink, at a time when a persistent drought was afflicting the land, but no similar instance has come under my notice; for all that, it does not follow that the Termite is incapable of an exploit opposed to all preconceived notions as to his habits, and scepticism in regard to those with which he is sometimes casually invested is usually a mistaken attitude to adopt.

This much is certain, though it happens very rarely: when a deserted City is found intact and

undisturbed by man or beast, its condition may safely be ascribed to a single factor—an unrelieved and protracted drought such as sometimes occurs in sub-tropical zones. It has been found, when such a tragedy is displayed, that before its consummation the population remains constant; and that with full recognition of its disastrous consequences, orders are obviously given, before the actual necessity arises, that the egg-producing powers of the Queen are to be curtailed; as the lack of rain continues, her output is still more restricted.

Nevertheless, her subjects are better fitted to withstand the stress of a long continued dry period than any form of life above ground; moreover they have sources of supply which are not at the disposal of terrestrial (above ground) beings. Hence the frequency of settlements and colonies of species other than those with which we are immediately concerned, in arid, waterless terrain or even in desert country.

If it be true that camels inhale moisture through their nostrils to an appreciable extent—and their actions on approaching oases after a long waterless march certainly lend colour to the theory—it is not impossible that the Termite is endowed with a similar faculty and that its spirillæ or breathing-pores are utilised in this manner. In the tropics the destruction of a Termite community by drought is unknown—in the case of *T. natalensis*, who dwell in a temperate climate, it seldom happens. Speaking personally, I have never seen a solitary instance.

Primarily, then, a tremendous responsibility devolves upon the youthful founders of each new

colony—the selection of a suitable site for their first excavations—one which not only promises^c but definitely possesses a permanent supply of underground moisture in sufficient quantity. Not running water, but soil imperceptibly permeated by it and suitable to the requirements of a great city, and likely to remain so for an indefinite period.

Had they not the power of detecting this moisture-content in countries where the rainfall is negligible, irregular or long withheld, their descendants, deprived of this necessary adjunct to their continued existence, would quickly vanish. As it is, instances of their water-divining powers are too common to be dismissed as mere coincidences or chance.

As has already been stated, no authority has yet arrived at any practical conclusion as to how the moisture supply, once ensured, is utilised in the City, or how an average point of humidity is sustained throughout it, even to the end of the furthest, far-flung tunnel. No visible water is to be found anywhere within the City limits, therefore there are no reserves; if, as is premised, supplies are drawn from the liquid percolating through the surrounding soil, it still remains to be discovered how the Termite takes advantage of it, or by what process H_2O can be resolved into the damp, warm mist which is a distinguishing feature of the interior of the City.

Again, the density of the clay citadel surmounting it is such that rain, however heavy and persistent, cannot penetrate it, any more than it can effect an entrance through the tough, waterproof material of which the galleries and corridors are composed; the

Royal Cell is made of a special cement-like mixture.

The connexion between every type of fungus found in the termitary and the moisture supply governing the growth and development of the former has been subjected to intensive study by American termitologists, and although their researches applied more to the lower forms of Termite life, the opinion of one is quoted:

"Dr. Hendree's researches show that termites, fungi (including some of the wood-destroying fungi) and wood form an interlocking biological association in nature. This ecological set-up may also include the protozoa and bacteria in the gut of the termite, but in the present discussion these will be omitted, since their precise role, beyond the necessity of the presence of the protozoa, is not yet determined. The wood and fungi of this association have no known *necessary* dependence upon termites, and even exist widely in nature, without any contact with them. Thus, the wood-destroying fungi thrive independently of termites in wood, in forests, and dwellings, but termites seem never to occur in wood anywhere without direct and continuous relations with fungi. This independence is, however, not wholly one-sided.

"Whereas termites benefit by the presence of fungi in their cellulose diet, the fungi in turn are favoured by some factors resulting from their association with termites. Their spores and hyphæ are carried about on the surface of the bodies of wandering termites and in their guts, and are thus carried through the soil and into galleries in wood, where, otherwise, they might not arrive. Termites thus aid in distributing

fungi in the very regions where their cellulose food occurs.

"Termites also by their mode of life produce and maintain in their burrows a moist atmosphere rich in carbon dioxide favouring the growth of fungi in their burrows and in their immediate walls. They provide the indispensable moisture for the growth of fungi. Termites are associated in nature and in dwellings with dry rot and decay of wood, not by mere accident only, but by the fact that they are not able to carry on their normal life without intimate and sustained association with fungi. Not all the fungi associated with termites are wood-destroying, but some of them are. . . . Fungi may even destroy the termite colonies themselves, if their growth is too rapid."

In Africa it follows that, in respect of water conservation, the Termites are faced with three separate sub-divisions of one vital problem, all associated with the measures to be taken to establish and control the point of humidity in regard to (*a*) themselves, (*b*) their forcing fields of mushrooms, and (*c*) their fungoid growths, whether beneficial or deleterious. They have solved them all. But . . . we do not know how.

Certain termitologists, in default of a more feasible explanation, ascribe the warming of the City to the decay of vegetable matter within its walls, or the fermentation of grass stored in the warehouses and generating, spontaneously, its own heat. Others adduce the theory that a vast congregation of termites must, of necessity, produce and exhale through

their spiracles sufficient heat to make an appreciable difference to the air conditions; very much in the same way as cows in a byre keep themselves warm on a winter night.

But the species with which we are concerned, although occupying cities with many millions of inhabitants, store neither vegetable matter nor grass, nor, indeed, anything of a combustible nature, spontaneous or otherwise. And their vital essence is not blood but hæmolymph—a colourless fluid, not confined to definite blood-vessels, but flowing through irregular spaces or sinuses. Whether the heat, if any, engendered by this fluid would suffice to warm a city two or three cubic yards in area is extremely doubtful, if not fantastically speculative. When a thermometer sufficiently delicate to take the temperature of a Termite has been invented the point may be more decisively elucidated.

Further, the triply-digested food stored in the warehouses contains very little caloric matter; when tested, it gives out no more heat than that apparent in the atmosphere; if its composition were different it would no doubt be subject to fungoid attack itself.

Lastly, an experience of my own relative to this subject of central heating may be given. I have found that the thermometric reading of the temperature of some mushroom gardens unconnected with any living quarters showed from 3 degrees to 5 degrees Fahrenheit higher than that of the surrounding cells and corridors.

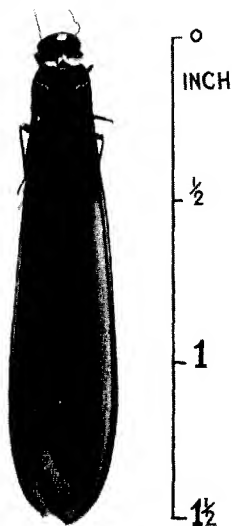
If it be difficult to imagine an invisible heating apparatus installed in the City, devoid of boilers,

pipes and thermostatic controls, how much more so to envisage one which would ensure variations of calorific value in different, undivided parts of it remote from one another.

Generally speaking, there are no ventilator shafts connected with the Cities of *T. natalensis* in South Africa, although indications of their use are noticeable in the Belgian Congo; where, among other species, they are common enough. Year in and year out a variation of only 9 degrees Fahrenheit in the diurnal temperature occurs in their homes, although that of the outer world may rise or fall twenty degrees or more. In exceptionally hot weather, say, exceeding 100° Fahrenheit, the fact that *T. natalensis* prefers hermetically sealed Cities would appear to add to the difficulty of regulating their atmospheric conditions.

Termites, as we know, anticipated the Germans in the extraction of nitrogen from the atmosphere; they have the ability to manufacture proteins from carbohydrates, but the science of chemical transmutations such as these belongs more to the province of the research chemist than that of the naturalist. In any case the investigator is driven to conjecture, and may conclude with Mr. Charles Kofoed, Professor of Zoology, University of California: "The source of proteins in the food of Termites is problematical," and again: "Bacteria possibly help in breaking down cellulose into sugar."

Mention may be made here, however, because of the chemical value attaching to the subject, of the discovery by Thom and Raper that arsenic in



THE PERFECT WINGED INSECT: AN ALATE, *T. NATALENSIS*
(Courtesy of the Natural History Museum, South Kensington)

different forms, coming in contact with certain fungi associated with Termites, produces the highly poisonous arsenical gas.

It is true that no Termites were inculpated in two fatal cases of this poisoning reported in London, in 1932, but the principle involved was the same. Wallpaper of the dwelling occupied by the victims was proved to contain arsenic; gas was liberated by the formation of mould, or fungus, due, largely, to atmospheric moisture on the paper in question; the lungs of the deceased contained high concentrates of arsenical gas. It is safe to say that if Termites existed in England in the days when arsenic-green wall-papers were in vogue, similar fatalities would have been much more frequent. Instances in the United States afford ample confirmation of this hypothesis. Wherefore, the employment of arsenical colouring is consistently discouraged throughout the States, and the exhibition of the poison as a preventive against Termite attack officially deprecated.

Tests in California have proved that at least three species have been "at times associated with one or more unidentified species of gas-producing fungus." To arrive at that conclusion, controlled Termites are encouraged to walk on artificially fungi-infested wood, previously impregnated with an arsenical compound. Unconsciously, they picked up the spores of the fungus on their feet. After removal to clean test material, fungus growth developed thereon and subsequently liberated arsenical gas.

However interesting this experiment, it cannot reasonably be assumed to contain any reflection upon

the Termite; to the unprejudiced observer it will be plain that he merely acted as an innocent agent or intermediary in the matter. In other words, his services were co-opted to demonstrate an instance of the deplorable carelessness of Man, in using, domestically, a highly deleterious substance to which such risks were attached.

The castle-building, with all its extraordinary variation of type, achieved by these insects, postulates a knowledge of architecture brought to a fine art; the sub-division of the City into cells, chambers and apartments, each adapted to a particular use, evinces a profound comprehension of domestic and social economy.

Of all these and other examples of scientific attainment, which will presently be quoted, one can only say: "Here are certain enigmas. Explain them how you will." Whatever the outcome, the justice of Reid's conclusion must inevitably be admitted: "There is indeed considerable reason to believe that the power of making mental acquirements has evolved to a greater degree in the favourable environment of the 'ant-nest' than among any other species of animals except man."

But why "man"?

CHAPTER V

PARASITES

"Yet Worker insects confronted with unusual conditions have been observed to behave in a manner demonstrating some power of initiative and adaptation, and the morphologist, considering the problem, will find it hard to deny the true individuality of any one member of an ant's nest even if he is willing to call the whole society a 'super-organism.'"

—Carpenter.

The Biology of Insects.

THERE are few dangers in the Cimmerian darkness of the Termite City, beyond the ever-present risk of intrusions by Man or beast; in the suburbs, however, of any *T. natalensis* settlement there are many. Weird, misshapen beasts lurk in the recesses of far-flung galleries; while in other Termite kingdoms, whole tribes of strangers, quite distinct from the rightful owners, take up their abode and pervade the outer marches. Thieves and vagabonds though they be for the most part, scrounging for food and reaping where they have not sown, they are treated, if they behave themselves—or rather if they are not found out—with kindly tolerance. Only when caught *in flagrante delicto* or when frankly hostile, do they suffer death at the mandibles of the City's police. Any inclination to oust the rightful owners from their homes and take possession of them is sternly repressed; cuckoodom

is never achieved by these pariahs; birth-control is more than indicated, for, assuredly, *T. natalensis* sees to it that this parasitic population is strictly limited.

In communities lacking the development and culture of the higher families such is not the case. In South America, in the colonies of *Eutermes Cyphergaster*, gangs of ruffians belonging to another species, *Mirotermes* *fur*, frequently take possession of portions of the property of the original owners and steal their stored food as often as they feel inclined. For the former are rank pacifists.

In India, genera of *Microtermes* live in the homes of *Odontotermes* and not only seize their land and lay out mushroom fields of their own but steal both crops, soil and spawn from their houses. Neither instance is so much a question of internecine strife as of plain pillage and rank robbery. In either case, they approach very nearly to human notions of sociality.

Unlike these low-bred relatives, neither *T. natalensis* or his cousin, *T. bellicosus*, rob, trespass or intrude. And here, of course, the human analogy is obvious—for to assert that a well-bred man, in the only rightly-accepted sense, would be incapable of such bêtises, would be exceedingly undemocratic.

Nor do they willingly submit to the exploitation of their home or property, for which both castes of Warrior and Worker will fight, literally, to the last gasp. Nevertheless, they allow sundry termitophiles—gnats, beetles and flies—of which there are many hundreds of species in Africa, to take up their quarters

in the outskirts of the City. And there they stop, and live and breed and die.

Occasionally, the hosts exhibit feelings of the most friendly description towards their guests, more particularly in the case of one variety of interlopers—the Symphiles of the Order of Staphylinidæ. This is not strange, because these inoffensive insects have the same allure for the Worker Termite as that possessed by their own cherished queen; they also exude, by means of specially designed glands or exudatories, a sweet-savoured liquid which is peculiarly attractive to the Termites. And they, in their turn, after refreshing themselves, invariably proffer a meal of stomodæal or proctodæal food to their benefactors. So lavishly, indeed, that these soon acquire the physogastric habit of the Termite queen; but, unlike her, their swollen abdominal development results in their exhibiting, sooner or later, a grotesque and horrifying appearance. Despite this repellent aspect, however, these lodgers are more than welcome to their hosts; they become really friendly; even the Soldiers seem to wave genially to them as they pass.

The same verdict cannot justifiably be passed on the Synoeketes, another Order of self-appointed guests, who, for some unknown reason, are tolerated in the purlieus of the City. So far as may be seen, except when hungry, they preserve an attitude of studied indifference towards their hosts, which is fully reciprocated. They boast no such recommendation as a store of sweet stuff available for their friends, and appear to be of a surly and unresponsive disposition. Doubtless, they serve some purpose in

the internal economy of the community, otherwise they would not be permitted to exist.

But if no legitimate excuse can be found for their presence, these guests by sufferance are at least harmless; and that cannot be said of the true parasites—the Carabids and other real enemies of the Termites. They have no redeeming feature.

They are murderers and cannibals of the most revolting type; they attack and eat isolated wanderers from the City and suck the ichor of defenceless nymphs straying too far afield. On the approach of a soldier they leave their prey and curl themselves into a ball like a hedgehog and, being protected by chitinous armour, which renders difficult any grip of their opponent's mandible, they often escape retribution.

Not content with this quite effective technique of defence, they support it by a poison-gas counter-attack when coming to grips with a soldier; for they have the faculty of emitting a peculiarly foul stench at will. It is an abiding wonder that these idle, dangerous intruders should be tolerated in a super-organised community like the Termites'. Yet, most curiously, no order is ever given to ensure their destruction or expulsion, though a massed attack on them by the Major Warriors would make short work of them.' There must be some reason for their continued presence, even in strictly limited number. Indeed, such restriction is evidence that their God must be well aware of the danger of a plurality of parasites; He has probably observed it in human society.

The comparison is not my own, but the outcome of a statement made by those famous biologists, Massart and Vandervelde, which, with permission, I quote:

"Our bodies, our domestic animals and food plants, dwelling, stored foods, clothing, and refuse support such numbers of greedy organisms, and we parasitise on one another to such an extent that the biologist wonders how the race can survive. We not only tolerate, but even foster in our midst whole parasitic trades, institutions, castes and nations, hordes of bureaucrats, grafting politicians, middlemen, profiteers and usurers; a vast and varied assortment of criminals, defectives, prostitutes, white-slavers, and other purveyors to anti-social proclivities, in a word, so many non-productive, food-consuming and space-occupying parasites that their support absorbs nearly all the energy of the independent members of society."

Wheeler holds that although man furnishes the most striking illustrations of the ease with which both the parasitic and host's rôles may be assumed by a social animal, his capacities in these directions have been little appreciated by the sociologists.

Man may suffer a good deal by comparison with the Termite; but he can teach the insect everything there is to know about parasites, except a method of suppressing them—and that the Termite already knows.

Most of the true guests of the City display the same physio-gastric symptoms as those exhibited by the Queen of their hosts. Lack of oxygen, want of exercise, total darkness and perhaps overfeeding

make their stomachs swell enormously and give them a hideous and revolting appearance.

But there is a remarkable distinction between the abdominal development of the Queen and that of the tolerated guests. Her body is uniformly enlarged and the glands which emit her sweet sticky fluid are sunk along the whole length of her turgescence.

Termitophiles, on the contrary, seem to have specialised in this characteristic, and their exudations are more centralised. Some of the Coleoptera species have evolved two or three pairs of exuditoria, which, fixed in their bodies like the horns of a floating mine, are attached to a sac of fluid nourishment, and can be turned off and on like the faucets of a tank. A tap is turned on when a Worker Termite, tickling its owner with urgent antennæ, signifies its desire to drink.

The concentrated obesity and the sight of these weird appendages of the monstrosities which exhibit them are more suggestive of a Dantesque nightmare than of an entomological specimen.

How they first became part and parcel of the community and how long it has taken them to arrive at their present state of bovine development—for these horrors are as much milch cows as the Jerseys of mankind and the Aphidæ of the true ants—and how the continuance of this breed of milk-and-honey producers is assured are matters well beyond our understanding. There is a reason for everything in the Termitary, though many of them are hidden from us.

Still it would be interesting to learn how the Termitophiles and parasites abandon their outdoor

life, and after gate-crashing, as far as they are permitted, into a Termite City, take up their abode there indefinitely, find mates and breed in an environment for which they certainly were never intended.

For, unlike the true ants, who do not live in darkness and whose guests enjoy easy access to them, the Termites offer no inducements to visitors; on the contrary, their home and its approaches are hermetically sealed against intruders and opened only at specific seasons. And then, the various exits are so closely guarded that the entrance of strangers, either friends or foes, is next to impossible. Nothing escapes the vigilance of the sentries on duty either at the fighting time or at the base of the ventilator shafts which some species employ.

Yet, these beetles, flies and gnats not only effected an entrance once upon a time, but were allowed to remain—some of them as honoured guests, instead of being instantly killed, as are all the Formicidæ, on sight. In lieu of being summarily slaughtered, they were led to the suburbs of the City, kept within strict bounds, fed until they eventually developed into milch cows, producing a very palatable milk, special glands for its manufacture and an extremely delicate apparatus for its excretion.

Even the outlaws among the parasites appear to receive extraordinary consideration. *Carebara vidua*, a parasitic ant, a frequent lodger in Termite communities and at all times a thief and murderer, is not suppressed, as well he might be, by starvation. That he is recognised as an undesirable neighbour is shown by the fact that once he has gained a footing the

Worker Termites wall him off from the rest of the inhabitants, and the partition they build has the queer distinction of a rough-cast exterior surface, whereas that facing the City is as fine and smooth as elsewhere. It is immaterial to the parasite. When his colony is established his workers, who are "minute, pale-yellow and blind," bore tiny holes through the wall by means of which they sally forth and raid the young of their hosts. The Soldier Termite is too bulky to pass through these narrow entrances, and therefore cannot retaliate.

This *C. vidua* is probably the first insect to forestall passenger-carrying aeroplanes. In Abyssinia, and elsewhere in the African tropics, the female Alate of the species is a few thousand times larger than the Workers. On leaving her birthplace to mate and found a new settlement, she takes with her a few Workers, who, cognisant of her intention, forsake their everyday tasks and attach themselves by their mandibles to the tarsal hairs of her feet. Thus, hanging on like grim death, they get a free passage through the air until their living plane lands on some Termite castle, where she proposes to carry on her parasitic existence by storming a strange domicile; then the transported Workers drop from her and help her to found a new home. It has been noted that these scurvy adventurers sometimes most ill-advisedly choose a male alate as their aeroplane. And as he dies after mating they perish miserably with him. Termites would never make mistakes like this.

* * * * *

Unwitting of the dangers besetting a tender neophyte wending her way through the purlieus of the City, Nympha, left to her own devices, had ventured farther afield than her experience warranted. Thus, strolling carelessly along a by-road, she had overtaken a female Alate to whom she made timid overtures and, not being repulsed, set off with her on a tour of discovery. So it was that, ambling along a little in advance of her new acquaintance, who was somewhat handicapped by her long, folded wings, she came to an unfrequented passage winding deviously into even deeper obscurities. "This should bear looking into," she remarked to her companion, as they turned into the tortuous lane.

Passing a rounded traverse of the path, Nympha threaded her way through a narrow entry. Suddenly she became aware of a fell, foul shape crouching in her path. As she hesitated before side-stepping hurriedly, the Thing sprang high in the air, its avid mouth agape, and with clashing jaws lighted on the spot where Nympha had been standing a second earlier. For, sensitive to the danger of the lurking Terror, she had turned and fled, her tiny feet keeping pace with those of her companion, who, equally disconcerted, was doing her best to emulate Nympha's efforts.

Both, as they ran, shouted unconsciously the Minor Alarm, which may be heard by any human listener in the world above who cares to provoke it.

It rang through the labyrinth of intricate corridors and, in reply, a company of Greater Soldiers hastened in the direction of the call. Others responded by

thudding their armoured heads against the walls of the City, until the echoes sounded in the very summit of the citadel. For the signal meant: "All Guards turn out; a sacred Alate is in danger."

So it happened that before the aggressor could efface himself or roll himself into an armoured ball or hide behind the wall he infested, he was seized and torn to pieces by the warriors; very little was left for the sanitary corps when they arrived to drag the remains to their appointed place.

But Cilla had no comfort to offer Nympha and her high-born friend when, panting and disordered in mien, they came back to her.

"You were rightly served," she observed to Nympha, "and, had you been alone, you would have undoubtedly been chased and liquidated, as one might say—without creating more than passing and disinterested comment. No one would have made a fuss about *you*. No, it was her ladyship here they all rushed to help; in fact, you owe her your life." And she touched the Alate deferentially with her antennæ.

"By the way, what was this beast who molested you?" she asked. "I heard the soldiers shouting 'Glyptus' as they ran."

"Indeed? Well, you had a narrow escape. He is a cruel and terrible monster. He would have knelt on you and sucked your blood to the last drop. If there is a raid on his kind very shortly, I shouldn't wonder. These parasites are becoming far too uppish.

"While I'm about it," continued Cilla, "you'd better beware of the Carabid beetles, too. You won't

stand much chance with them if they find you alone. Better keep away from that part of the suburbs altogether.

"Of course, when you quite grow up and are allowed to visit the dairies, you might remember to call on Corotoca phylo. He belongs to one of our Symphile first families and does not in the least resemble that skinny and horrible Glyptus. Coro is very gentle and, like all fat people, extremely sympathetic. The vintage he exudes is famous, and if you always remember to take him a little present, you will find him very responsive.

"Another hint you will find useful is to avoid Termitopulex; of course, he's a tolerated guest and quite harmless. He thinks he's very funny, skipping about all over the place, but there's really nothing in him.

"Indeed," said Cilla; "there are dozens more, but you'll know all about them presently, without my telling you."

CHAPTER VI

THE PHILOSOPHY OF CILLA

"Human society appears to be tending in the same direction. Our remote posterity will perhaps be toothless, hairless, without olfactory organs, toes and possibly other appurtenances. They may have better brains and better social behaviour. We must look forward, however, not only to physical losses in our descendants but to the loss of many of our institutions, for progressive evolution involves not only an acquisition but also a loss of character."

—W. M. Wheeler, Ph.D., Sc.D.
Social Life Among the Insects.

THERE had been thefts from some of the store-houses nearby the garden where Cilla still kept watch and guard over the grazing nymphs, amongst whom were Nympha and Imago, her newly found friend. And by some coincidence—if, by any chance, there are coincidences in the Termite world—Miles, the soldier who had rescued the pair, had been detailed to stand sentry over the rifled cells.

"Some of those wretched interlopers, I suppose," remarked Cilla casually to him. "I wonder that orders have not been given to turn them out: they're always robbing us. We might almost be living among men."

"Without doubt they will presently be cast forth into the outer light, if not entirely liquidated," replied Miles. "Meanwhile I may expedite that

desirable consummation by catching and killing a few. We have no room for thieves within our City. And these, as you rightly observe, appear to have assimilated the viciousness of Man with remarkable success."

"I wish you would tell me something about Man," said Nympha, sidling up to her nurse and touching her lovingly. "Imago, here, may like to hear about him too. Perhaps she may meet him on her bridal flight."

"That would be a doubtful pleasure," remarked Cilla dryly. "Still, Imago, if your eyesight permits, which is by no means a foregone conclusion, you may perhaps meet him, when you reach the light. For myself, I am well content to forgo the privilege."

"Man, indeed! Let me see. One first heard of him a million years ago. Then, as now, we had good reason to fear him, although we were—and always have been—guiltless of any just cause for his antipathy towards us. On the contrary, we were his very good friends. And he . . . he is our most inveterate enemy."

"Still, when he lived in the trees he gave us little trouble, beyond raiding our homes for food and eating our winged children whenever he got the chance. In my mind is a picture of him gibbering in the branches, peering at the moon and snatching at a passing swarm of our people."

"But when he came down from the trees it was another story. Dear me! how time passes. It seems only yesterday when, hairy, chinless, low-browed, bent-backed, black and brutal, he crouched naked as ourselves by our citadels and tore with long, foul

talons at their walls. He vanished in course of time, but others followed, of many and varying types. And they in turn gave place to Men as we know them to-day. But their habits have changed, even as ours, since the years when with wings two feet across we flew about the primeval world.

"And now, disdainful of the shelters of boughs and leaves and caves in which he spent the dawn of his race, he has copied us and built cities and citadels and dwelling-places, great and small. But there is this difference. While we live together in perfect amity, Man divides his cities into cells in which each individual lives with his brood, indifferent to the welfare of those around him, intolerant of their very existence."

"A selfish beast, it would appear," observed Miles critically.

"He is," agreed Cilla. "Of course, his buildings differ from ours to some extent. He lacks our God-bestowed knowledge of architecture and the sciences and spends the best part of his life in acquiring enough learning to enable him to earn a living of some sort, however futile. His knowledge passes, and his cities. Some are as ephemeral as the butterfly, others endure for a season or two. But the wind and the rain take toll of them and they are rent by the sun and the frost. And Time, who destroys all things but us, effaces them, utterly, at last.

"To do him justice, Man is not discouraged. He repeats his attempts, improves upon his methods, ever and ever striving feverishly towards a perfection which, he realises, in this, as in other projects, is

sufficiently remote. He moves too fast, but his efforts lack continuity; the wisdom acquired by one race of Man is not handed on to the succeeding one; they do not seem to learn by experience."

"You may well say that," interrupted Miles. "Once, one of them put his hand down a ventilating shaft I was guarding. Twenty of us seized it. Unfortunately I missed my grip," he added apologetically. "But the others held on and discouraged this Man."

"No, my friends never came back. They died to save the City. And what death could be more glorious?"

"Exactly," Cilla agreed. "But even if our castles are destroyed by him and his white metal tools—and it happens often enough—we can always retaliate by retiring to the bowels of the earth, whither he cannot easily follow us and where he cannot completely destroy us."

"And remember this, children. Whether in our castles or secret fastnesses, we have one incalculable advantage over Man. None of our individual communities, however large, associate with other families or races to any appreciable extent. We live apart from them, and in consequence we suffer from no sickness which might be communicated by contact with other people. Indeed, we are immune to any diseases, such as are always bringing disaster to Man. Thus, mercifully for us, his activities are restricted and a well-defined limit set to his devastations and to his brief life itself. But we? We shall live as long as the earth endures."

"Meantime he pursues us vindictively and, although his own ignorance and short-sightedness are solely to blame, grudges us the very food he himself provides. Before he came, this Modern Man, we were content with what we found without his aid. Now, he places provisions at our doors and curses us that we partake of them.

"Still," said Cilla didactically, "we have much in common. For instance, Men are, in effect, peripatetic battlefields, but few of them know it. They are ignorant of the forces within them or the endless cannibalistic strife raging among the beings which inhabit them, many of which are fighting ceaselessly to overcome their hosts. They have no control over the myriads of organisms which infest them. Neither have we, but we have eliminated all those antagonistic to ourselves. So that the spirochaetes and similar life within us are there for our benefit. How, indeed, could we eat wood without them?

"When Man can breed bacteria inside him," said Cilla sarcastically, "which will enable him to eat his furniture, if he wants to, he will have done something worth while.

"So much for him, biologically. I regret that I cannot report very favourably upon his moral attributes, the foremost of which seems to be his inordinate predilection for unearned increment. Man, I am given to understand, with few and beautiful exceptions, lives by robbery disguised under a multitude of names. He has a curious system of morality which allows of all sorts of rascality provided the perpetrators are not detected. The crime of being

found out is unpardonable; unless, of course, the operator has amassed much treasure. And as the whole aim of Man's life is to succeed at someone else's expense, most of their time is devoted to that desirable end. Then they become as gods."

"You say 'someone else'," said Nympha: "do they not all work for the common good? Does not all the wealth belong to the City?"

"By no means," answered Cilla; "they work chiefly for themselves and the despoiling of others. Everyone has his own store, to which, if lucky, he adds by open or covert filching from his neighbour. And, for the most part—this is a very strange thing—they regard with hatred and contempt the neighbour they have wronged."

"Surely this is not the custom when they are cousins or of similar kin?" asked Nympha.

"They hate them worst of all," was the reply.

"But haven't they any charity? Don't they deprive themselves of anything for others' sakes?" asked Nympha, wonderingly.

"Very seldom, and mostly vicariously. Some of them, however, become extremely charitable when they hear Death approaching. Then they bequeath food, or its equivalent, to all sorts of people. They regard it in the light of fire insurance."

"I imagine you speak in parables?" suggested Miles.

"Not altogether. They have a quaint concept—one of the vast number of superstitions to which these Lords of the Universe are prone—that they will be consumed by fire, when Death has had his way with

them, unless they pay beforehand for all the sins they have committed. So, distraught with fear, they dig into their treasure and, as they think, make restitution. Even those who are not convinced of the soundness of their theology take these precautions."

"It seems to me a very selfish creed," remarked Nympha; "for their little lives can be but of small account."

"Oh, they have many such. One learns that quite recently, being unable to imagine a more exalted personage than Man, they proclaimed a God, who, they asserted, had made them all in His image. But they did not specify if the half-beasts who first broke open our cities, or those who succeeded them, or Man as we know him, were replicas of Him. I think the last, because they cannot conceive anything more noble, more god-like than themselves.

"Since then, I gather they have been fighting among themselves and killing each other because they disagree concerning the correct method of approaching their God. As, indeed, I am credibly informed they are doing at this moment.

"We," said Cilla, in parenthesis, "we might just as well begin a faction fight with our neighbours Hodotermes, who, though inferior to ourselves, come of quite decent parentage, because we have different ideas on the subject of harvesting."

"Have they many ways of appealing to their God, then?" asked Imago.

"Dozens. They used to do it by slaughtering all sorts of animals, though I believe that custom has

fallen into disrepute. They believed, most curiously, that their God liked to see blood flowing. Even now they employ wise men to teach them the best method of ingratiating themselves with this God."

"Why?" asked Nympha.

"Well, it sounds fantastic, but you mustn't laugh. They think that if they are not burnt they will survive Death and live hereafter as individuals preserving their identity. To which end they and their wise men have all sorts of incantations and ceremonies. As if any of them were worthy of a personal survival! Anyhow, their belief is the exact opposite of our own. We know that the community is everything and will survive, and the individual is nothing except a component part of it, and will be absorbed later into the ego of the Universe.

"In truth, Men with much treasure are the most convinced of their fitness for this precious hereafter. They have been so flattered and fawned upon in their lives that they cannot conceive themselves disappearing into the darkness to merge into nothingness. For the idolatry of wealth is far more widespread in the upper world than a belief in any God. There are no Men who would not sell their souls for treasure—if they had souls to sell. Treasure is the standard by which they measure everybody."

"Do they all obtain it, then?" asked Nympha.

"Well, no. It is the exception and not the rule. But the majority who have not done so well in the struggle for wealth derive what consolation they can from the superstition that some recompense will be forthcoming in the hereafter for all the miseries of

their mortal life. From what I hear of it, they cannot well be blamed.

"Others again, a negligible minority, believe as we do that service to one's fellow-creatures, loving-kindness and unselfishness towards the hungry, the sick and the maimed, and unremitting self-sacrifice, constitute the acme of human goodness and that it calls for no earthly reward.

"Adherence to such a creed is proof that they follow the teachings of one of their prophets, whose ideals were so different from their own, so strangely divergent from the ordinary self-centred existences of humanity that, of necessity, they invested this prophet with the attributes of a secondary God."

"Have they, then, only one God?" asked Miles.

"Only one, under different names, but many prophets. Even with their help I think that they have not yet found the true God. As we, who are not new-comers on the earth, did long ago."

"Perhaps in a million years Man may find Him," suggested Nympha.

"It may be so," agreed Cilla, without enthusiasm. "At present he blunders through the universe, destroying the balance of Nature, murdering horribly and persistently all the animals he claims his God created for his sole benefit, but shouting loudly to that same God, when one of these turns and rends him, or in time of war or tempest, drought or flood.

"But in a million years Man will at least have recognised his insignificance in the scheme of things and will see himself as he is—a floating speck in the ocean of Time. With that realisation he may change

in mind as assuredly he will in body. I see him through the ages to come, dwindled in physique, as we ourselves have shrunk, hairless, toothless, toeless, with vitiated senses of sight and scent and hearing, because for centuries he has not employed them rightly."

"He will indeed be an extraordinary spectacle," observed Miles judicially. "And I think it doubtful if what he calls his 'civilisation' will last until he reaches that stage. Nature, or war, or disease will see to that. In any case, without charity he will not persist. It is the mainspring of our own life and at the moment, from what you say, he appears to be lamentably lacking in that divine attribute."

"I know," answered Cilla. "Well, let us justify our recognition of it and hope that, despite his selfishness, his vulgar boasting and blatant self-assurance, Man will some day improve. He may not attain perfection—that would be too much to expect even by his own standards, but he may at least attain, some day, a faint resemblance, spiritually, to ourselves."

CHAPTER VII

THE TERMITES' VIEW

"Man, a mere bubble in the void, regards himself as the standard measure of the universe."

—Maeterlinck.

"FROM what you have said," remarked Miles, "I gather—correct me if I am wrong—that this race of men, who in the dawn of creation arose, we suppose, from the same primordial globule as ourselves, suffers from a curious obsession. That he is a unique organism; that he spends some of his time in praying to his Deity, but more in preying upon his neighbour: that he kills and eats any form of life on earth—a procedure highly repugnant to vegetarians *like ourselves*; that he is concerned, primarily, in his own welfare and, however much he protests to the contrary, cares little for that of the community.

"As a class, his fellows hold that everything on earth was created for their benefit, and they deny the ownership of a soul, or whatever they name the spiritual essence we recognise as such, to any other animal. They are so intent upon their own salvation, so convinced of their own importance, that they regard the idea of any other form of life challenging their spiritual supremacy as a phantasy of the imagination.

"Yet, paradoxically, we are led to believe that they

are definitely anti-social and that they sometimes live within touch of one another and go to their deaths without ever exchanging a friendly word or deed. This conception of civilisation," said Miles gravely, "seems to me the most incredible of all. Except perhaps their devotion to material matters, which they consistently exhibit in their everyday lives. To the extent—I think you said?—of purloining the property of other people who are not in a position to protect it."

"You appear to have summarised his most objectionable qualities," answered Cilla critically. "But you are far from envisaging the lengths to which he will carry his most glaring inconsistencies. For instance, some of the prophets of his faith—or faiths—condemn the taking of life in any form: others, again, with pomp and circumstance, beseech their Deity to help them in doing so. As for what he terms the 'lower animals,' what shall be said of the mentality of a person who implores his God to fill the seas with fish so that he may kill and derive profit from them?"

"But in his heart Man is always ill at ease. Always he seeks for signs and wonders to confirm him in his half-baked beliefs; the stars, the planets, chance happenings and omens; but he is no surer of himself or his future than when, living like us in caves, he peopled the world with evil spirits.

"Ours is the same God as his, though Man, I think, would scout the idea. But we do not vex Him with futilities such as these. Why should we? We are at peace with all but raiding enemies, whom we can certainly repel: we are free from disease, and subject

only to catastrophes which we must endure, uncomplainingly, we live our ordered lives until such time as, despite the hatred of Man, His purpose will be fulfilled.

"Man is still groping in the darkness to find, with the aid of his many interpreters, that purpose. In the process he has acquired much knowledge. He can move mountains. Not by faith, but with the aid of his machines. But of the genesis of life he knows nothing. Else, out of the profundities of his erudition he could explain at least one of our everyday problems: the predetermination of the sex of the thirty thousand eggs the Mother gives birth to, daily, in exact proportion to the needs of the City.

"We know it is our God Who so ordains the quota. But Man, denying Him so far as we are concerned, and failing any other explanation, ascribes the event to Chance. Blind Chance! If that were so our Empire would long ago have perished.

"Well," said Cilla, "I seem to be always talking, but if I have added to your knowledge I am well repaid. Now, I must take the children home. Not you, Nympha. On the eve of your last moult you're old enough to look after yourself."

"I am greatly beholden to you for your diatribe on this painful subject," said Miles; "involving, though it does, the remembrance of a lost opportunity of making things unpleasant for at least ~~one~~ member of the human family. And now ~~there~~ comes a summons. I am called upon to make one of a guard over a party working in a prospecting gallery on the north-east frontier. I am given to understand they were sent

there to take advantage of a fine supply of food in the neighbourhood. If the young ladies would care about it, I shall be happy to escort them for a walk in that direction."

"I take it there is no danger to be anticipated in following your suggestion?" asked Cilla. "Anyhow, you are no doubt aware of the penalty consequent to endangering the life of one of the Royal Family? An unpleasant one, I think."

"She has a sense of humour, this nurse of yours," said Miles; "come along, then, children."

They set off, their guard stalking ahead of the youngsters, who in touch with each other followed close at his heels. And as they walked there came forth from dim traverses and half-hidden entries, in obedience to some occult order, other huge-headed warriors, who, without more ado, joined the leader of the procession. Two of them fell in behind the nymphs.

Leaving the confines of the city proper, and avoiding the crowds of hurrying Workers thronging the outskirts of the inner chambers, the party came at length to a narrow passage leading from a main artery. Though but a few inches across, its low-arched roof—the colour of old terra-cotta—was smooth and even, its elliptical walls as shaped and rounded as a railway tube.

Two streams of Workers, their antennæ touching, head to tail, flowed, rather than marched, like an interminable stream of grey-white water in opposite directions along the narrow gallery. They kept close to the walls, and in the space between the two living

currents strode the Lesser Soldiers at precise intervals. And as they marched they urged the Workers to closer formation and greater speed.

It was along this roadway between the two disciplined armies of labourers that Miles shepherded Nympha and Imago whilst the Lesser Soldiers made way for them without relaxing for one instant the control of the traffic. Although the Workers paid not the slightest attention to the party, the children noticed that each member of the stream travelling in the same direction as themselves carried in its mouth a tiny grain of soil no bigger than a pin's head: whilst those of the incoming army were empty-handed.

"They're building in a hurry, ahead," Miles told them; "the Workers we meet are going for more material."

Suddenly the road they were following turned sharply upwards, not at an acute angle, but rather like the rounded elbow-joint of a three-inch pipe, which, indeed, the gallery greatly resembled. But the speed of the Workers did not slacken even when the gradient changed to a starkly vertical ascent; they flowed up and down it as swiftly and surely as on the level ground.

Keeping pace as well as they could, behind their longer-legged protector and guide, the novices scrambled up the steep incline and then the sheer ascent, hanging on to the sides like geckos on a wall. For now the sides had lost their smooth surface, and with a better footing in view had been left, by deliberate intention, coarse and rough.

Still, the silent and attentive Soldiers followed behind ready with help should it be needed; in front, Miles and his companions cleared the way. Soon, the line of route was more of the nature of an inverted funnel, in which the Lesser Soldiers seemed to have some difficulty in preserving order.

Presently the two nymphs became aware of a strange sensation, some weird happening outside their experience; a distinct alteration in the air they breathed. They had, in fact, for the first time in their lives, reached the limits of their subterranean home, and passed into the atmosphere of the upper world, only separated from them by a thin shell of clay. Its proximity may have brought back to them atavistic memories of the days when their ancestors flew about the world: more probably their senses were stirred because the scented night air of the forest without lacked the heat and humidity of the City.

They did not know it, but the tunnel they were traversing had left the shelter of the soil, pierced the reed sides of a grass-thatched building and was creeping up one of the wooden poles supporting the sides and making for the cross-pieces of the roof.

For a few minutes, a foot or two from the ground the two nymphs climbed and clung to the roughened surface. Then Miles halted; his Soldier companions went on, but he turned and came back to his charges. "I sense danger," he said: "you must go back: I should not have brought you so far."

Even as he spoke there came a sound of turmoil ahead; the serried ranks of the Workers broke and a wave of them came sweeping down the tunnel, some

running, others dropping over their fellows' bodies. From afar there came the sound of human voices and the harsh grating of metal rubbed on wood. "Could they have interpreted the roar which resounded through their corridors, the Workers would have known that it meant: "Them blasted White Ants have started on the poles. Bring a light, Bill."

The blind Workers in the van of the expedition could not see the flash of the electric torch, but they were, of course, aware of it, and of the menace in the human voice and what it portended. As they hesitated in their work, motionless, but unafraid, a second slash of a hatchet shore down the length of the pole, sweeping the shattered remains of the tunnel and countless Workers on to the mud floor of the hut. They fell in a confusion of red clay and struggling termites and the same voice shouted: "Bring some paraffin, Bill, and kill the bastards." But those who were left alive in the fractured tunnel had already turned about face and were seeking safety down below.

Thus it was that Miles and the nymphs who had retreated into their own territory found themselves surrounded by innumerable Workers, some laden with pellets of building material, others burdenless, but all intent on sorting themselves into some arrangement of order, whilst marking time and, apparently, awaiting instructions. Presently there came from the direction of the City a stridulated murmur crackling like the sparkings of a wireless transmitter; the clangour of the Lesser Soldiers beating their heads resonantly against the walls of the corridor filled the damp air.

"The Alarm," said Miles to his charges; "it's a reply to my message."

"Your message," repeated Imago; "how did you send it?"

"I don't know. Except that I did. More Workers will come now and start repairs once they've sealed the outlet. Extra fatigues will be told off to replace those that are gone, too."

"There were a great many," said Nympha thoughtfully; "are they all gone for ever?"

"Gone? Of course they're gone. What did you expect?" answered Miles curtly. Indeed, his usual suavity had forsaken him.

"All those Workers. Poor things. I am sorry for them," said Nympha.

"Sorry? Bosh! What have you to be sorry about? They died for the City."

"Can't any of them creep back?"

"Of course not; the tunnel's being sealed now."

"Then if any of them still live they cannot return?"

"Certainly not, and they know it. Those who escape Man will be killed by the ants, the lizards and the great spiders of the Upper World."

"Why sound the Alarm, then?"

"I find your silly questions very wearisome," retorted Miles. "Besides, unless I am greatly mistaken, I shall have plenty of trouble on my own claws soon. The Alarm was sent out so that work could continue, as it always does, without any undue delay."

"Of course, in the same place if we are attacked a thousand times. And let me tell you something. Sooner or later we win."

"Tell me, Miles. You spoke of trouble; how can this affect you?"

"I should not have brought you into danger, Princess," he answered; "I do not know whether I shall pay for the indiscretion or not. If it be ordained that I shall, a guard of my fellow-soldiers will wait upon me, accompanied by Workers, and I shall be led away to a death-chamber, walled up and left to starve. But let us get away from here."

So saying, he hurried his charges through the flood of Workers making for the scene of the disaster in response to the stuttering resonance of the Alarm which had not yet ceased.

Normally, the population of a Termite community never overtakes its food supply. Starved or emaciated specimens of the race are not found within the boundaries of any City. It requires, therefore, no great stretch of the imagination to realise that the Ruling Power which foresees the danger of a failing larder, if not actual scarcity, must, of necessity, be endowed with the power of issuing orders that the output of eggs should be curtailed accordingly.

Although this result might reasonably be secured by a reduction in the rations supplied to the Queen, there is no evidence extant that this course is ever pursued; the only instances of deliberate food restriction on the part of her subjects occurring when, by any chance, and on the principle that no machine can work for ever, the Queen becomes incapacitated and unable to meet the demands made upon her; in other words, when her egg-production falls below the

standard of the popular conception of her one and only duty.

Once the decision is made, orders are given, and the fate hinted at by Miles is hers. But because she is too large to move, Workers seal up every entrance to the Royal Cell, and leave her there to starve.

On the other hand, when there is a super-abundance of food in the neighbourhood and the Queen, working at full capacity, is unable to produce enough progeny to deal with it, no blame appears to attach to her. Her subjects—or their Ruler—recognising her physical limitations, merely enlist, forthwith, the services of reserve queens.

Thus, when by the unconscious generosity of Man, or by an Act of God—if the killing of a tree by a chance stroke of lightning, can be so construed—cellulose in quantity becomes available, the Termite population increases in ratio to the amount at hand or to be expected.

This implication of looking ahead is important. Because no Ruler of a Termite City would give instructions for an attack on a blasted tree until its sap had vanished utterly and the wood become thoroughly seasoned, a matter, perhaps, of a year or more. When that had been accomplished the Termites would be ready, in force, to deal with it.

These are matters of fact, observed by me many times. What is not so well understood is the prescience responsible for the orders given not only in a restrictive or expansive sense, but in connection with the most economical method of acquiring the booty lying in the Upper World. The subterranean Worker

Termite is not a forager in the literal sense; it is only by violating his home or runways that he can be seen in the open. Yet, if edible substance of whatever bulk falls or lies within reasonable distance of his kingdom; he or she will be infallibly directed to it. (The word "reasonable" is used advisedly, for no member of the higher families willingly trespasses on a neighbour's territory.) And the gallery driven from the City to the nearest point from which the quarry can be exploited will be as straight and true as the compass bearing illustrated, as will presently appear, by *T. meridionalis* of Northern Australia.

But, however extended, it must avoid the property of other species, all of whom, peaceful citizens though they be, intent only on their own business, actively resent foreigners.

The prevision of the Termites' Ruler fails, apparently, in the face of the animosity of Nature, Man or beast. Hence the sequel to the expedition observed by Miles and the nymphs. Some huts of grass and green timber had been built in a sun-stricken valley of Africa, and for a few months had served their purpose.

Then, when the bark had curled and fallen from the upright poles and the wood become dry and sapless, the word went forth. At once, organised bands of Cilla's compatriots obeyed orders and hastened to the feast. Not from any animosity towards the Man who had erected the huts, but simply to benefit themselves and their people by harvesting the food so lavishly provided.

To which end, working night and day under a

canopy of clay, they drove a tunnel with infinite care directly to the base of the building, gained the footings of the uprights and began their envelopment. But because these were hidden in the dried reeds forming the sides of the hut, the galleries were not visible to the inmates until they reached the cross-pieces of the roof. The reaction of the occupants has already been described.

"He seems a very loud and blustering person, this Man," remarked Nympha to Miles, as they neared the outskirts of the City. "Why, after preparing all that beautiful nutriment, was he annoyed?"

"That is what we can never understand," replied Miles; "why he should go to all that trouble and then blame us for taking advantage of it. It would be so easy for him to build on stone or brick: then we should know that his wood was taboo. And, unless we were really famishing, we would not attempt to interfere with it by constructing runways over the foundations.

"However, whilst regretting, perhaps, as you are inclined to do, the loss of our friends who died in a noble cause, we may console ourselves with the reflection that in course of time we shall inevitably consume that building. This is all the more certain because—though so far it has escaped his notice—our neighbours the *Hodotermes* are already at work on the grass and reeds which constitute the walls of the hut. Presently, they will collapse—what is left of them—for *Hodotermes* has eyes and can work in the light of day, and will convey all that nutriment into

his store-rooms regardless of anything that Man can do.

"He may be wanting in the high intelligence with which we ourselves are gifted," said Miles, reflectively; "but he makes a thoroughly good job of anything he undertakes. On the whole I should say that he gives Man infinitely more trouble than we do. Apart from the fact that his cities are most cunningly hidden underground and next to impossible for Man to find, he has an extraordinary predilection for standing crops, a propensity which renders him extremely obnoxious to the growers thereof. And now, as I perceive Cilla in the distance, I will leave you to your own devices."

CHAPTER VIII

BIOLOGICAL

"... the slaves are neuter individuals and have no offspring... consequently they can have had no ancestors that performed servile duties. It follows that the slaves must learn their work and therefore that the performance of it is not instinctive but intelligent and rational."

—Dr. G. R. Reid, M.B., F.R.S.E.
Principles of Heredity.

IT is as well to hear all sides and the above quotation applies equally well to Termites and to Ants, if indeed the two are not confused, as they usually are. For myself, I hold that the former are inspired and neither learn nor inherit a knowledge of their manifold duties.

Admitting, however—not for the sake of argument, for no argument would arrive anywhere—that in the initial stages of the City's foundation, the primary King and Queen are endowed with the knowledge that will enable them to build a refuge and procure food for themselves over a period of several months, a second problem straightway arises. That their ancestors have never done either and have been equally uninformed in regard to any trade or profession can, for the moment, be ignored.

Subsequent to the disappearance of the Royal pair

into their hermetically sealed retreat, when sustenance no doubt comes to them as it did to Elijah, and when the colony is in its infancy, a tiny mound is sometimes—but not always—seen on the site of the original excavation. It is formed, grain by grain, of the detritus of further underground workings. But, so far, no human being has discovered how the hillock rises, inch by inch, into the air. The natural inference is that the Termites, working by night, would come into the open as the colony increased in strength and pursue their callings as masons, in the open air. Such, however, is not the case. Otherwise, the marauding ants, lizards and beetles whose name is legion on the veld would have no difficulty in effecting an entrance into the embryonic City and, as is their custom, devouring all the inhabitants. And that is the reason why an unsealed entrance from the outer world is never seen, except at the flighting season, when the settlement is in an advanced state of development.

Yet, if it be so decided by the inscrutable Power who governs the Termites, that mound will grow slowly, week by week, pushed up, as it were, from the bowels of the earth and gradually assuming its appointed form. It may be peaked and proportioned like a geometrically designed cone, a buttressed and battlemented castle, a spired and steepled cathedral or a square-turreted tower. It may take the shape of a domed cupola, a bulbous retort or, as in Abyssinia, a soaring column, thirty feet high, straight, cylindrical and beautiful, rising sheerly from the amorphous mound which gave it birth, and towering

above the surrounding country like a red clay Cleopatra's Needle.

Whether exquisite in design, or of the bizarre and shapeless type, these marvels of industry stand forth as monuments of applied architectural science the source of which is far beyond us.

"Instinct?" If the word meant anything, especially in the life of the Termite—and, risking the charge of dogmatism, it most assuredly does not—it would still fall short of fathoming the secret of the vast system of organisation involved in the construction of these triumphs of industry and skill.

It is as if a Worker said to another, by means of his "peripheral sense organs"—"Come, let us build a ventilating tower to our citadel according to the inspiration as it seizes us. It must be thirty feet high. It must be symmetrical, tapering and straight as a plumb-line would drop from a star. It will take twenty years and a ten-million Termite power, working twenty-four hours a day to accomplish our task, and we must allow for an adequate supply of provisions during all those years. Further, as is our custom, we must work in pairs, throughout the job, one to bring the brick—which is a pin's-head grain of clay—the other to lay and cement it. Being stone-blind we shall never see our work; nevertheless, it must be perfect in conception and faultless in execution and in strict accord with Nature's abhorrence of line and angle."

No, it is by no human standards that cause and effect can thus be implemented.

Speculation, in any case, as to the means whereby

these monuments of inspired energy and tireless industry are erected is overdue. For word has gone forth throughout those countries where Man has made his presence felt, and the castles of the Termites are seen no more in lands where once they abounded.

The builder, cognisant of the dangers of attracting Man's attention . . . and animosity, builds no more.

But if these examples of his terrestrial efficiency are sufficiently impressive, what shall be said of the application of pure science within the City itself, apart from those instances already quoted? The perfectly planned apartments, the halls and cells systematically arranged in accordance with specific requirements, nurseries, hatching-rooms and garden areas connected with the utmost economy of space: the pillars and arches supporting the domed roofs and the calculation of estimated strains and stresses, which allow for the utilisation of enough material to support them, and no more. More important than all, the chambers in which are lodged the most cherished castes of the City—the spare or reserve reproductives.

There is not one genus of the higher families which does not recognise these as a first charge upon their resources and does not make meticulously careful provision for them. They are the first consideration of the community, for failing unremitting attention to these, the life of a City might well be regarded as uncertain to the last degree.

Entomologically, these reproductive castes are divided into three sub-divisions:—

1. True King and Queen.
2. Second Form reproductives, male and female.
3. Third Form reproductives, male and female.

But whereas the King and Queen are perfect adult winged insects, the second and third forms differ from them not only in the arrested development of their wings but in their reproductive powers. For confirmation of this statement I am indebted to Dr. W. M. Wheeler, Ph.D., Sc.D., Professor of Economic Entomology, Harvard University.

"Although the origin and meaning of the various castes in termites is a matter of considerable interest and has given rise to much discussion I shall have to treat it very briefly. It was formerly supposed that all termite eggs were alike and therefore produced young larvæ which were at first the same but took on the various caste characters as a result of differences in feeding (trophogeny). Recently, however, Bugnion and especially the late Miss Caroline Thompson of Wellesley have shown that the castes are at least to an important degree determined in the egg. Miss Thompson found that the very young nymphs or larvæ on hatching may be divided into two series, one with larger, the other with smaller brain, eyes and reproductive organs, and that the former give rise to the reproductive, the latter to the soldier and worker castes. In all probability even closer study will show that each of the three reproductive and each of the two sterile castes may be distinguished at the time of hatching by certain slight internal characters. The observations of Miss

Thompson and Dr. Snyder also indicate that each of the adult sexual forms can reproduce itself and the forms below it in rank, but not those above it. Thus the first form adults or true royalty can reproduce all the castes, the second form adults can reproduce their own form, the third form, the soldiers and workers: and the third form adults can reproduce only themselves, the soldiers and workers. . . . The soldiers and workers are normally sterile, but sometimes they become fertile and on such occasions probably reproduce only their own castes."

It is worthy of record, however, that although we are, of course, quite ignorant of the means whereby the exact proportion of the second and third form is maintained, their numerical strength is low—a matter, so far as has been ascertained, of a few score in a City numbering many millions of inhabitants.

The hatching out of a few hundred or thousand royalties in a City of this size would not affect its life or insect-power in any way. They would all leave it at the appointed time, and, if they were lucky, would form future settlements. But any excess of the second or third form reproductives, wholly apterous or with embryonic wings, who never leave their home, would be mere wasted effort, such as is inconceivable in a Termite community. They do no work and have to be fed by Workers, who could otherwise be more profitably employed. Hence the limitation to a number, which indubitably is calculated with a view to a margin of safety.

Supplementary, gravid queens of the second form have been found in separate cells contiguous to the

Royal Cell, but data relative to their installation and impregnation, by whom, by whose orders and at what intervals is non-existent. It is certain that they have their own staff of nurses and attendants, though how they are selected for this duty is a mystery. So is the identity of the king or consort of these minor reproductives.

As a member of the Blood Royal he should have left the City at the first flighting, therefore he must belong to the second form who do not depart from their home town. So the question arises, who chooses the queens and appoints the kings to accompany them into the bridal chambers? There must have been selection in both cases, for, as has been previously remarked, nothing is left to chance in the Termitary. The possession of the reserve queens, when it was decided that they should become breeders, could not resolve itself into a matter of conflicting claimants for the honour. Certainly, although the amatory instincts of members of the same genus and City are highly developed, they do not fight among themselves like Men and other animals, however strong the inducement offered.

No naturalist has thrown any light upon this problem of the mating of the minor forms of reproductives; I have never met one who could claim to have identified a secondary king. There is, however, evidence of the activities of these reservists in another direction. Occasionally, if rarely, it happens that a pair become acquainted—one might almost say "attached"—and either with the tacit approval of Higher Authority, or without it, wander off along

one of the far-reaching galleries leading to the outskirts of the City. If they are lucky enough to escape the attentions of lurking parasites, they reach the blind end of some sequestered lane, set to work to pierce the hard wall and burrow into the soil beyond at some carefully chosen spot. Tunnelling as far as is advisable, they dig out a home and set up house-keeping on their own account. It is possible that, unlike true royalty when first they found a colony, the subterranean lovers overcome the food difficulty by practical assistance of members of the City they have abandoned, who were cognisant of their adventure. Not improbably, a good-natured Cilla would be implicated in such a happening.

Following the reproductive castes in order of merit and so far as generalisation is possible are the:

4. Large Workers, male and female.
5. Small Workers, male and female.
6. Large Soldiers, male and female.
7. Medium-sized Soldiers, male and female.
8. Small Soldiers, male and female.

It is contended that no City has been found containing all these castes: such a one is certainly outside my experience. As it would take several lifetimes to determine the sex of all the minor soldiers and workers in the Termitaries of one district in South Africa alone, it may be said that only an academic interest attaches to such intensive classification. On the other hand it is well known that many genera of low development are altogether lacking in certain

castes; there are even tribes who boast no workers.

So far as human understanding can visualise this problem of sub-division of partially sex-atrophied species, there seems to be no sense in it; which is all the more reason for suspecting that if only we knew it, there is a very definite one.

However that may be, there is a point of outstanding importance in the life of the Termite, the significance of which has been overlooked by most writers on the subject—the organisation of the City's labour forces. No one can explain how it is done, yet, watching them at work, one is irresistibly driven to the conclusion that a master mind is responsible for the super-control of these myriad Workers and the discipline of those who guard them.

For in that City there is no disorder, indecision or idleness, no unemployed lounging at street corners or wandering, workless, through the by-ways. Separate squads attend the Queen, wash and carry her eggs, groom and lick exudates from her, superintend the babies and carry out all their various tasks without confusion and, so far as can be observed, devoting their time to one job only without running from one to another. And, whatever it may be, the number employed is never in excess of its requirements.

It is the same with the Major and Minor Soldiers; each has his appointed duty, be it sentry, patrol, traffic control or ordinary police work, and never does one interfere with another. In appearance the Warrior Termite differs in appearance to an extraordinary degree from his brother workers. His enormous

armoured head and comparatively huge mandibles have led, in the past, to his being frequently mistaken by novices for a totally different kind of insect. Strange and terrifying though this aspect may be, he possesses, in a remarkable degree, all the virtues of an ideal warrior—courage, tenacity and self-sacrifice; his devotion to discipline is such that he is never absent in an emergency, whether it be the liberation of the nymphs or an attack upon his home territory.

No one has recognised the qualities of the Soldier Termite so understandingly as Maeterlinck, and it may not be out of place to quote him on this occasion, the more so, perhaps, because I have in mind the flat and dogmatic contradiction of his theory by one of his own profession.*

"Its own weapons have not been borrowed like ours from an external world; it has done better than that, proving itself thereby to be nearer than we to the springs of life; it has created those weapons out of its own body, evolved them from within itself by a kind of concrete materialisation of its heroism, by a miracle of its imagination, of its will-power; or perhaps because of some secret alliance with the soul of this world, some knowledge of mysterious biological laws for which we are still groping. And indeed there can be no doubt that in this case, and in certain others, the termite knows more than we do; and that the will which with us is limited by our consciousness and governs only the mind, with the

* "Maeterlinck's view was quite erroneous. The white ant was not cleverer than human beings."—Professor Julian Huxley.

insect spreads over all the dark region in which function and are fashioned the organs of life."

All police duty seems to be relegated to the Minor Soldiers and so far as *T. natalensis* is concerned, these warriors are usually found patrolling the galleries and corridors. They are certainly not in evidence on the rare occasions when his Greater brother affords a remarkable instance of the triumph of mind over matter by deliberately facing the sunlight. The fact that he does it only once a year—at the fighting season—does not detract from the strangeness of this anomaly. For, throughout his life, with this single exception, he displays the utmost aversion to even a suspicion of natural light. To emerge, when called upon, from impenetrable darkness and walk blindly into the open to repel an attack or guard an exit, argues a strength of character which cheapens the adjective "super-human." When we know by whose direction he does so, we shall probably understand the method by which he overcomes, temporarily, his invincible repugnance to the upper world.

CHAPTER IX

REPRISALS

"By a 100,000 years ago our ancestors had reached the stage of the Neanderthal man. . . . And so far as the actual, fundamental, biological structure of our society is concerned and notwithstanding its stupendous growth in size we are still in much the same infantile stage."

—W. M. Wheeler, Ph.D., Sc.D.
Social Life Among the Insects.

"**M**OST likely there will be trouble over last night's incident," remarked Cilla, pausing meditatively in her grooming of Imago; "Man is very vicious when the mood seizes him. I rather think, too, that the rich store you observed being appropriated by our Workers was not exactly intended for our benefit.

"Miles tells me that it was probably part of Man's dwelling. In which case he might perhaps be excused for his otherwise unaccountable rancour and subsequent assault upon us. Still, if he will produce such delicious wood so freely, and so conveniently placed, what else can he expect? When the Master tells us it is properly seasoned and ready for us, of course we must obey orders."

"Why go so far away when we have a great,

beautiful soft-wood tree growing out of our own citadel?" asked Imago. "Look! its roots are over our very heads."

"Such trees are sacred," replied Cilla impressively; "never is a growing tree or plant or bush rooted in one of our own castles attacked by any of our people, even if they are on the verge of starvation. Why? It isn't done, that's all. You will probably be killed if you suggest or attempt such an outrage. Not that you could eat it, anyhow. You must remember, also, that dry bark and leaves fall from that tree and form mould—very excellent it is and less difficult to negotiate."

"But what can he do to us, this Man?" asked Imago, with a touch of scorn.

"Very dreadful things if you regard Death as more than a trifle. . . . Otherwise, nothing."

"But surely we are safe down here below?"

"I wouldn't be too sure about that," rejoined Cilla; "once Man takes notice of us we are in a precarious position. And one might almost say that we are in uncomfortable proximity to his works, whatever they may be. Also, he is 'an ingenious beast capable of any amount of mischief. Hark! What was that?"

She broke off suddenly to listen intently as a dull reverberation in the distance sounded to Imago like the breaking of a terrestrial storm above their heads. "It is the S O S," announced Cilla, gravely; "trouble is coming."

Instantly all the Major Soldiers in the neighbourhood began to beat their horny, chitinous heads

against the hard walls on either side of the streets, or crouching, thrashed the indurated, well-trodden pavements till they rang again. Afar off, the stridulated signals of the Minor, given only in cases of grave emergency, answered; a hum of varied sounds indicating acknowledgment of both filled the vast Termitary to its uttermost limits. And the burden of it was: "All work to stop. The Royal Cell is in danger." At the same time a strange sougling, as of a large animal's intermittent breathing, surged through the streets, in puffing gasps like the spasmodic exhaust of an internal combustion engine.

At once an extraordinary commotion arose. Warriors and police, great and small, came running from all directions to throw a cordon around the entrances to the Royal Cell. This done, with prompt and unhurried discipline, they stood in serried ranks with mandibles uplifted toward the source of the threatening blast. It came from the road lately traversed by Miles and the nymphs.

The living stream of egg-laden Workers flowing to and from the hatching-chambers suddenly ceased, cut into two by the Warriors, who allowed no one to pass; for all knew that their Queen had paused in her eternal task and that her attendants had fallen back from her couch and mustered in line between her and her soldier guard; in every garden the nymphs huddled together in shining masses.

Then, as all the Termite world waited, and the Alarm, its purpose fulfilled, sank to a murmur and died away in the distance, a long and lamentable string of Workers emerged from the road whence

came the weird discord of the wind. Their steps were uncertain and their pale bodies were sprinkled with a white impalpable powder. Reeling, in disorder, half-paralysed and wholly demoralised, they shuffled in broken files into the main thoroughfare, until, steered by Minor Soldiers away from the centre of the City, they wended their appointed way towards some remote destination.

The ranks of the Soldiers opened to let them pass, but no friendly touch greeted them, no effort to groom or stroke them was proffered by the onlookers. On the contrary: the populace, stricken for once into absolute quiescence, watched with assumed indifference the sad procession stagger past and disappear. Only those who fell by the wayside and after convulsive struggles lay motionless were seized by the Sanitary Workers and dragged away.

"Yes, they must all die," said Cilla to the wondering Imago, who, released from the torment of her penultimate moult, stood shaking her long, gleaming wings half-nervously, half-complacently, by the side of her friend.

"The spiracles through which they breathe are choked with the poison-dust pumped into the galleries by Man. This is his reply to our essay of last night. We have interfered with his designs and must suffer for our presumption.

"This manner of destroying us was more effective once," she went on musingly; "when we were so ill-advised as to try and help our comrades afflicted with this vile white powder. Then we all so died through our organs of taste. Now we know better. No

Worker is permitted to touch or massage anyone on whom it settles."

"What will become of the poor things?" asked Imago, pityingly.

"They will not be taken to the Death Chamber, for that would mean contamination for the rest of us; they will be buried in some secret and unfrequented spot—some dry corner where the fungus cannot make contact with them, and there will be no risk of gas emanating from their tainted bodies."

"Then will Man be content?" demanded Imago.

"You little know him. Look! Or rather direct your attention to what is happening over there."

For the sad cortège had passed, the last members of it reduced to a thin trickle of writhing, exhausted victims; every corpse had been removed. The routine of the City began again and the ordinary labourers turned to their interrupted tasks. But before they could resume them a great crowd of Workers came surging along the wider thoroughfares, flocking in thousands to the scene. From far-away quarries in the environs of the City they came, summoned by unknown power, and they marched in pairs. One carried a grain of sand or clay; his half-section empty-handed by his side ready to emit the tiny droplet of liquid glue which would effectually cement the minute 'aggregates' of the wall they had been instructed to build.

"What are they doing?" whispered Imago.

"Sealing the passage through which the poison was carried," answered Cilla.

"But isn't the danger past?"

"By no means. But we can foresee and guard against the sequel of the attack. Man, it would seem, is sadly lacking in initiative. What he has once done he will do again. In this instance the specimens of his race with which we are dealing follow an unvarying plan of campaign, which is no novelty to us. When, as they think, sufficient time has elapsed for their poison to stupefy us, they will pump enough gas into our homes to kill the rest of us. It never does. For one thing the City is too large; secondly, if that partition wall is finished in time their fumes will hurt no one."

Even as she spoke the multitude of labourers fell to work, laying the base of the wall straightly across the corridor they intended to close. Steadily it rose by millimetres while thousands of Workers toiled feverishly at the brick-laying and Minor Soldiers strolling amongst the throng prodded them to further efforts. Thus in the course of a few hours a partition of clay reached to the ceiling of the passage; seamless joints binding the whole in an invisible patchwork.

As it progressed the number of labourers diminished in proportion to the available space; when the top of the partition approached the roof there remained only enough to complete it without getting in each other's way, the majority of the artisans having departed on their several occasions. The few who carried on worked systematically, running up one side of the wall, depositing their fragment of soil and, never hesitating for an instant, hurrying away for another. Behind each followed the cement-

carrier. As he expelled the minute drop of liquid upon the speck dropped by his mate, he pushed the atom into position and using his head as a mallet, thrust it more exactly into place.

Soon there was no room on the surface for anyone except the finishers of the upper section. These experts made short work of the last gap between ceiling and partition, filling it in as with mortar and smoothing over the joints with meticulous care. At last it was entirely closed and only a few Workers seeking vainly for a fault lingered on and over the wall. And thus, many a time, have I seen them working.

"Quite a good job," remarked Cilla, who, idle for once, stood regarding the masons' efforts with kindly approval; "now they can start their gas-attack."

"Do they always use the same stuff?" asked Imago.

"By no means: they have all sorts. We avoid some by seeking higher ground, because it always sinks to the lowest levels. But unless the poisoned air is promptly excluded you might say that all varieties are fatal to us."

"Is there anything else they can do?"

"Oh, yes. They can dig us out. A long and wearisome procedure, but they are sometimes foolish enough to attempt it. They have a curious superstition that once they capture and remove the Mother, our community comes to an end. Quite erroneous, of course. Because those who survive the partial destruction of the City, reseal it and bring our Reserve Queens into action. Then it will be decided whether we rebuild or move underground to a new site.

Naturally, these assaults involve great loss of life and limit our activities considerably. For a time, at least."

"That closed passage," asked Imago, pointing to the finished work, now clean and clear of Workers; "will it never again be opened?"

"Considering how long you have been under instruction and how soon you will leave us, you appear to have benefited to quite a negligible extent by the knowledge—I was in hopes—you had acquired," answered Cilla, tartly. "That street will be opened just as soon as the 'All Clear' signal is given. It may be to-morrow: it may be in several moons. But opened it surely will be. And, if reclosed, opened again and again and still again."

"For how long?" demanded Imago.

"Indefinitely," replied her mentor, curtly.

* * * * *

Above ground, in the dusk of a sweltering day, two men sat in the mess-hut of the rubber camp, and considered morosely the poles and cross-pieces which were disfigured with *fragments of termite clay and* shattered sections of galleries hanging to the scarred wood. Tin pannikins of milkless tea stood on the table before them. And as they sat, half-naked and perspiring freely, they cursed the heat, the mosquitoes, the tea and the unclothed Zulu boy who had made it too weak.

"Seen no signs of them again, Bill, have you?" asked one, earnestly regarding the ridge-pole. And Bill answered:

"Not since we pumped cyanide into their blasted holes."

"If that doesn't fix them we'll try carbon bisulphide. Stinkin' stuff, but reliable, as the bloke at the store said."

"You never know," said his friend Joe; "they're cunning devils. D'ye mind what that scientific cove said, who came to see the boss last week? 'Me good feller,' he says, superior like, 'if anyone with your brain development lived ten thousand years, he wouldn't acquire one jot or tittle of the knowledge possessed by these yer insex,' says he."

"Meanin' the white ants?" I says."

"Meanin' the Termites," he answers back snappily. "What's a 'jot and tittle,' Bill?"

"Damned if I know," replied his companion. "Whaddyer lookin' at?"

"Them grass walls. Seems to me they're a bit thinner."

"Thinner? Why, they're fadin' away. The bastards have been at them, too. Tell yer what. If the boss is goin' to keep on this camp, he'd better let us dig out the bloody queen. That'll put stop to their blasted capers."

"Think they're the same gang?"

"Sure 'they are."

But he was wrong. The Termites attacking the grass sides of the hut were another and distinctly primitive variety, *Hodotermes*, grass-cutters and daylight foragers, who, as we shall shortly see, are blessed with sight.

Working independently of their subterranean

friends, although they themselves lived, no less elaborately housed, under the ground, they had been quick to perceive and benefit by the coming of the white men to the valley. Then, realising that a rare store of food had been brought to their very doors, they were busily gathering it, night and day, harvesting where they had not planted, reaping where they had not sown; and, one may well imagine, giving thanks to the Gods of Mischance who had led men, all unwitting of their presence, to build uninsulated huts of wood, grass and reeds, well within their grasp.

CHAPTER X

THE CAMP IN THE FOREST

"The social life of the termites seems to have permitted the individual to benefit by experience and to have raised the level of behaviour in some of its aspects from instinct to intelligence."

—C. A. Kofoed, Ph.D., Sc.D.
Professor of Zoology,
University of California.

THE main camp of my multitude of wild-rubber collectors near the junction of the Tugela and Mambula Rivers was built in a clearing at the edge of a forest of *Euphorbia Triucalli*.

To reach it, after a drop of three thousand feet from the high veld, one had to ride or walk some seven miles along a rough road cut by my foremen Joe and Bill and gangs of Zulu labourers through thickets and groves of the same trees.

At the base of the foothills rising towards the sheer ascent from the valley and along the lower lands, sloping river-ward, they grew in countless millions. Their chief characteristic, at a distance, was the black-green, unhealthy-looking verdure. Nearer at hand, abandoned clearings, overgrown with coarse bush, marked the sites of long past cultivation.

Narrow "kafir" paths winding through these deserted patches led tortuously from the uplands to the rivers. On either side, inhabited termite castles

reared their blunt pinnacles; others, no longer tenanted, and fallen to ruins, showed, by yawning cavities at their bases, that marauding ant-bears or porcupines had raided the erstwhile City beneath and dispersed its people. Henceforth they would serve only as lairs for lurking mambas or the wandering fauna of the valley. Towering above all, grey, granite cliffs buttressed the escarpment of the high veld so sharply where they outlined against the turquoise blue of the African sky that they seemed to overhang the camp.

At close quarters the finger-like fronds of the Triucalli foliage are unattractive; they are more like bunches of arrested tendrils than leaves, and they contain, as does the bark of the parent tree, a highly poisonous latex.

It was this juice that six white men, two hundred Zulus and myself were engaged in extracting, in bulk, careful always that it entered neither the eyes nor the mouths of those engaged in tapping. So powerful were the irritant qualities of the latex that any contact of a smeared hand with an unprotected eyelid resulted in intense pain only relieved by copious flooding of the eye with cocaine and oil.

The presence of this toxic and unidentified element is emphasised because of its unique power of resistance to termite attack. No other tree within my experience exhibits this property, although certain bushes and shrubs in Abyssinia contain a poisonous essence and various members of the *Ficus* family possess it in a lesser degree.

Nature has seen to it that the Triucalli should

flourish only in the intensely hot valleys of Southern Africa, where a temperature of 125° Fahrenheit in the shade in summer-time is no rare phenomenon. Her decision appears to have been taken with the object of discouraging both man and termite. Man regards the climate with disfavour, and however efficient and persevering the various Termite families inhabiting the valley, none can negotiate the green bark of the Triucalli, protected, as it is, by its acrid essence. Wherefore, these trees stand immune in their unnumbered millions, defying man and beast alike.

My concession occupied some forty square miles of that perfervid territory; it is safe to say that termite cities, colonies and settlements underlaid every yard of it, save only where rock or stone forbade it. With the coming of the white man, where none had lived before, the termites increased and multiplied incredibly.

The felling of the trees along the route of the seven-mile road was their first incentive, for so soon as the repellent bark dried and dropped from the fallen trees, they became edible. And this happened as soon as the sun evaporated the deadly contents of the bark. Then the news was carried by some occult means to the denizens of the underworld and red clay galleries grew up and over each prostrate trunk; it was but a matter of weeks before every tree was covered by a coating of the thin, friable soil.

It looked hard enough, but in reality it was a mere shell of compost under cover of which the insects worked without cessation. By mouthfuls at a time they ate steadily from the surface downwards towards

the heart of the tree, and carried each grain away to the store-houses of their homes. Soon one knew that the services of many supplementary queens had been enlisted, for the hosts of termites at work were as the sands of the seven seas.

One tree after another was attacked, enveloped and devoured, until only the empty shell of their clay covering remained to show where trees, both great and small, had stood and fallen. . . . The simulacra of each twig, each fragment of branch broken in the crash, strewed the ground like twisted earthen tubes, which the naked feet of passing natives crunched hollowly to the sound of breaking egg-shells. It was but a matter of months before the last vestige of the trees utterly disappeared.

But the demand for food created by the overwhelming termite population did not lessen, and they turned their attention to the white man's buildings. No sooner had their poles and rafters, stripped of their bark, dried out, than a concerted onslaught upon them began. Not because of any antipathy to Man, but because he had planted wood in the ground, ostensibly for the Termites' use. And who were they to distinguish between generosity and expediency—they whose whole lives were devoted to unselfishness?

Then, those in charge of the different camps were faced by a compelling problem. Either they could condone the assault on the assets of the Company, thereby outraging not only their own moral sense but the most sacred convention observed by Man—consideration for his own or . . . other peoples'

property: in other words, they could sit still while their houses tumbled about them. Or, by mass murder, they could do their best to exterminate the ravagers. Naturally and in duty bound they chose the latter course. For, in Man's philosophy, the interests of all earthly life must be subordinated to his needs.

Orders were given to pump arsenic dust and cyanide gas into the ground runways; open tins of carbon bisulphide were placed in them and soil heaped upon the entrances; visible wood was flooded with creosote and paraffin, even as it is to-day.

The termites for a time retired.

Then it occurred to me that simple insulation would obviate further trouble. All buildings, thereafter, were raised on brick or stone piles surmounted by circular plates of zinc, pointing downwards. Thenceforward Man and Termite lived at peace. As, indeed, they might do anywhere so far as the more highly civilised types are concerned. Only when through carelessness any material was left lying on the ground for a few hours did the insects demonstrate their presence a few inches beneath our feet; the wooden haft of a pick, the handle of a spade, a coat or discarded cigarette-box would be attacked as soon as darkness fell.

Cut off from the cellulose supply afforded by our buildings, they turned their energy elsewhere. The flooring of the company's store, built up on brick pillars four feet from the ground, collapsed when a heavy packing-case was dragged into one of the rooms; it was then seen that the underneath side of



THE AUTHOR'S RUBBER-CAMP IN THE FOREST
(Copyright)

the pine boards was eaten through and riddled like a sieve. The Termites had picked out the one pillar on which the zinc was insecurely fixed, leaving a space half an inch wide between metal and brick. A thin tunnel of clay, invisible from the front of the building, had run direct from the soil surface, up the pillar and straight to the one weak spot. This is their usual procedure; and in this and in many similar cases I have seen it only remains to explain how these blind insects, who never explore, learnt of that tiny crevice.

Further, it illustrates a recognised faculty possessed by the Termites, in that, whenever they attack wooden floors, they leave sufficient wood to support the weight of the contents of the room without risk of collapse. The additional burden of the packing-case was in this instance responsible for the downfall of the floor. Yet, a man will spend many years of his life in mastering the formulæ whereby strains and stresses are calculated before he acquires the engineering knowledge which appears to be part and parcel of the Worker's mentality.

Incidentally, it may be remarked, that however hungry, Termites will not trespass on a human habitation, however tempting, where human beings are continually on the move; if it were possible to sustain a perpetual vibration within it, no building would be attacked by them, provided, I think, that the vibration was not mechanical.

I placed, one day, on the bare ground of a barren clay-pan not far from my head camp an ordinary plywood Swedish match-box. Forty-eight hours afterwards, it was an empty clay mould of the exact and

unbroken shape. It was proved by digging that Termites had driven a vertical tunnel through two feet of iron-hard sun-baked clay, till then uninhabited by them, straight from one of their own corridors, to the box, devoured it and sealed up the tunnel they had driven. Three more boxes placed similarly met with the same fate: but metal boxes were untouched, nor was any attempt made to exploit them.

It was my custom to take a gun at dawn in the cold weather and hunt for guinea fowl through the "mfuzi" bush. As the sun rose higher, I once shed my khaki tunic and hung it on a convenient shrub or branch of a tree. Possibly a vagrant puff of wind dislodged it. It is certain that at least on that occasion, on my return a few hours later, I found the garment riddled by Termites and half-covered by their hastily built runways. This happened where no signs of them had previously been seen, but it only happened once.

Millions of trees in the Triucalli forests were tall and stout, crowded together and, as has been said, immune to Termite attack. In the summer-time, frequent thunderstorms raged through and over the valley, their bolts striking trees or dissolving into sheets of liquid fire which ran like flaming water over the iron-stone ridges. When the branch of a tree was struck, a ragged furrow ran down the trunk and showed where the lightning had made contact with the earth. The riven bark invariably healed quickly. The bough, whether one or six feet long, died as the sap withdrew from it. Thereafter, when the stricken branch was sufficiently seasoned, anyone making his

way through the labyrinth of the dark forest would plainly see—for the Termites recognised no reason for concealment in these cases—the usual tunnel running up the trunk. It rose, always, by the shortest possible route straightly to that dead bough, surrounded and enveloped it. It was only a matter of time, according to its size, before that dead wood would be totally demolished.

No sound tree of all the myriads in the valley ever showed indications of Termite attack, for *T. natalensis* does not prospect for food, nor, being stone-blind, could they find it if they did. Yet in the dark recesses of their home, the Workers had been told of that solitary branch, invisible, perhaps, owing to the dense foliage, to the eyes of Man, and had been unerringly guided to it. Every summer gave proof of it.

In order to test the truth of an assertion made by more than one South African, to the effect that in this and similar territory densely populated by Termites, they would build aerial ways to reach white pine-wood, of which they are inordinately fond, I drove two iron fence-droppers, 6 ft. by 1½ in., into the hard soil one foot apart; a deal board connecting them was secured by copper wire at either end, two feet from the ground.

For two days there was no response to this gesture of mine, no indication that news of the booty had been conveyed to the Termites: at dawn on the third day, two inches of runway had appeared and was climbing up both droppers. Broken open, they were found empty, the Workers having retired at the

coming of the light. The runs were scraped away and the droppers coated with coal-tar, thick, treacly and distasteful to all insects. There were no further developments for a week and I conjured up a vision of the Termites either awaiting instructions or taking counsel together. Then, on my return from an outlying district, I found that a cone of clay had arisen from a point midway between the two droppers, gained the board and had half-covered it with a canopy of clay. It was significant that the elongated cone was not composed of the cement-like substance used for the outer coating of their citadels, but the more friable compost of which their temporary runways consist.

From this experiment the following deductions may be drawn:—

(a) The Termites had learnt—as always—that there was highly desirable food within their reach.

(b) That the easiest method of attaining it was by way of the iron droppers.

(c) Being checkmated there, they had been told that direct approach through the air was feasible.

(d) That the means whereby the Termites became acquainted with the whereabouts of that deal board and the method by which they obtained possession of it, postulates in this as in innumerable other instances of a similar nature, an occult sense far more wonderful than the attribute denied them by Man, which for want of a better label he recognises as “intelligence.”

CHAPTER XI

THE FLIGHTING

"Indeed, were any but a minute proportion of these to survive, the Termite would conquer the world, even to the dispossession of man."

—Claude Fuller.

(*Ag. Jour.*, S.A. Vol. IV, 1912.)

FOR months the rays of a sub-tropical sun, unshaded by even the wisp of a cloud, had beaten down upon a parched world, baking the soil to the consistency of iron slag. Wandering bush buck, finding the thorny mimosa of the upland slopes wanting in shade, had descended to the cooler safety of the Euphorbia forests; even the snakes avoided the dry grass and sought refuge in the undergrowth. The air was but a burden of quivering heat-waves; a filmy mirage blurred the hills of Zululand.

In the middle distance the waters of the river, shrunk to a series of stagnant pools, shone like sheets of quicksilver in the blinding sun, their placid surfaces only broken when a huge lizard, weary of basking on a sandy bank, plunged into the warm water.

But if the heat of the world above was unbearable, it did not interfere with the domestic economy of the City: the subterranean life went on in the air-conditioned home, and Imago, who had passed the last

stage of her development, was holding converse with Cilla on the subject of the expected rains. Incidentally, she was very proud of her long, transparent wings. For she had gained the status of an adult Alate, the perfect insect, identical in form to her ancestors who had flown about the world in Miocene days, untold millions of years ago.

She had some reason, for they were very beautiful. Thin, diaphanous, and lined with the delicate tracery of membranous veins in an exquisite skeleton leaf, they stretched their rounded tips far beyond the length of her body; close to their bases the definitely marked sutures showed like a dark transverse thread. And Imago, in her excitement, little thought that, presently, by means of those threads, the wings of which she was so vain would drop from her like a garment that is shed.

For many hours she had been uneasy: filled with a strange longing, and, on the evening of this summer's day, she had sought Cilla to complain of her unwanted languor.

"Don't you know the reason?" demanded Cilla. "It's because your time is drawing near, and because in the upper world, the long, dry season is drawing to a close. I can scent the coming rains. Ah well, you'll go off into that undiscovered country and I'll never see you again."

"But must you always be a Worker? Shut up below here all your life with nothing but endless toil to look forward to?"

"Oh, no. It's just possible I might be a Queen myself, some day. You may not believe it, but

stranger things have happened. Of course, I should never have beautiful wings like yours, or see the world above. But I should be a mother, nevertheless. In fact there's not a lady Worker amongst us who does not dream of becoming one. That is to say, a supplementary Queen."

"That will be funny," sniggered Imago, with the inconsequence of youth; "why, you must be quite old, Cilla, dear."

"I apprehend that your criticism is tinged with envy," answered Cilla, with dignity; "I don't suppose I'm more than a hundred years old, as Man counts them. I suppose you'll be calling me 'neotenic' next. No matter; if such a consummation came to pass I should at least go to the Death Chamber thankful that I had not been utterly neglected in life. Good evening, Miles," she added, as their soldier friend passed and touched her. "When will the warning sound?"

"In a few hours, I expect," he replied, continuing on his way.

"And where has he been? I haven't seen him lately," asked the nymph.

"Sanitary squad," replied Cilla, succinctly; "it seems he got into trouble over you and Nympha."

"Well, he needn't be so gruff about it, especially as I'm leaving so soon and we're not likely to meet again."

"None of us will meet," said Cilla, sadly; "except, perhaps, Nympha and myself. And she won't be a nymph after to-morrow. In fact, she's undergoing her last moult at this very moment."

"Anyhow, you'll see her sometimes," rejoined Imago, who was becoming bored with what she regarded as maudlin sentiment.

"As ships that pass in the night, perhaps. Just a touch of our antennæ. No, I haven't anything to look forward to unless . . . unless my dream comes true."

"Well, cheer up; we'll hope for the best," said Imago, casually.

"Thank you. And now a parting word of advice. When you leave the castle, fly as high as you can. Down wind, if there is any. And don't attempt to get rid of your wings until you come to earth again and are safe. Because, when they have news of your coming all sorts of beasts will be waiting for you. Feathered, furred and clawed monsters. Worse than Glyptus, if anything."

"But I may fly away from my prince," sighed the nymph.

"You'll find one sooner or later, when you send out the call. That is if you escape your enemies. But a prince won't be much use to you, once you're in a buzzard's gizzard. Hark, there's the signal at last."

For a murmur was seeping through the obscurity of the City. Born, no one knew where, projected from an unknown source, it spread, whisperingly, around and about the more densely populated quarters, enveloping the suburbs and all the outlying maze of their countless passages and lanes. Like the faint susurruration of a muted harp it echoed in the high altitudes of the citadel, resounding in far-flung alien

haunts to sink at last to the profundities of the lower cells where the countless millions dwelt.

"Something tells me I have to go at once to the North Passage," cried Imago, dancing with excitement; "good-bye, Cilla darling. I'm off." She touched her old nurse once and ran off to join a party that was already moving along the North road.

And now from every point of the compass came the rustling of myriads of wings as the nymphs hastened towards their appointed outlets. Marshalled by Major Soldiers into long, winding queues, like human beings outside a terrestrial theatre, they crowded the corridors to the exclusion of all other traffic, climbing in disciplined files towards freedom and glorious adventure.

Meanwhile, fatigue parties of Workers, detailed to that end, wrought feverishly at the sealed entrances to the upper world. Soon, shafts of light pierced the gloom. At the first glimpse of it, in place of the feeling of repulsion with which it affects all cryptobiotic animals, the nymphs were seized by a frenzy of excitement. It was as if the crowding thousands had been touched, as one, by the incentive to madness produced by an unknown element. Quivering and vibrating, their bodies responded to the ferment in their brains; their tiny feet began to move in a concerted rhythm, a veritable dance of liberty.

Stray Staphylinidæ, whose temporary abiding-places had been invaded by the throng, slunk into less public corridors or, swept into the crowd, endeavoured to efface themselves and look as if they had business in its midst.

Thus it was that Miles, on duty in front, perceived Paracorota, a pushful parasite, intent on ingratiating himself by vibrating like the nymphs and essaying an uncouth travesty of their gyrations.

"Stand back," ordered Miles; "what are you doing here? Going to see the world, perhaps? Not this time." And with a single lunge of his great jaws he shore the intruder into the mysteries of the nymphs into two pulsating halves.

Still the Workers wrought impetuously at the breach, as, indeed, they were toiling at each and every exit used in the time of Exodus. Until, at last, sufficient hard-baked clay had been removed to allow of free passage. Then, and not till then, did a squad of Major Soldiers, waiting near-by, advance and encircle the opening with their mandibles; until their heads were almost touching. In point of fact, they were not so concerned with the departing nymphs as with the safeguarding of their home. Wherefore, waving their mandibles blindly, and regardless of the hated light, they sought for signs of danger in the air, and, apparently, found none.

For the expected signal—of whose nature we are ignorant—was given and, simultaneously from every breach, some yards apart, arose a cloud of nymphs, pouring out in an unbroken stream, their transparent wings gleaming fitfully in the rays of the setting sun. Some of their owners, in their excitement, dropped them at the outset, but the majority rose into the hot air of the upper world like a tenuous veil of spangled mist.

Those who had failed in their first essay to fly made

nervous attempts to regain the shelter of their late home; but the majority disdained any effort to escape their destiny. So they ran about in every direction, touching and feeling one another, disengaging, denying and seeking frantically for the elusive Prince, with whom it was ordained they should link their fate.

Ten minutes passed and the mad rush of the escaping alates slackened, dwindled to a thin trickle and resolved itself at last into a few stragglers who had been rounded up by the Minor Soldiers and driven from outlying galleries into the open. Finally, the exodus ceased.

Then, as if in obedience to a wireless message sent at the same moment to the guardians of all the openings, their great heads were gradually withdrawn and waiting Workers hastened to repair the breaches which with infinite trouble they had broken open a few minutes earlier. Thus, the City would remain inviolate for another year: unless immature nymphs remained within its limits in such quantity as to warrant another flighting. But that was a matter for Higher Authority to decide.

The ascending swarm of adventurers—male and female after their kind—who gained the higher air swung to the cool breeze which heralds the breaking of a South African storm, and disappeared in the near distance; others, less enterprising in their flight, faltered and dropped to earth in countless thousands nearer at hand. But the sight and sound of their passing had evoked memories of past banquets in all the creatures of the wild, and as if by magic the life of the veld anticipated the coming of the night, and . . .

awoke. Francolins, cheeping to their early summer broods, fluttered in coveys to the scene, grounded and fell upon the hapless alates; crested guinea-fowl, click-clacking insistently, flew fast from the timber; a khoran or two stalked from their cover and hastened to the feast. Lizards, frogs and ants appeared from nowhere and took their fill; from a high ficus-tree a family of grey monkeys swung themselves down and ran about cramming the helpless insects into their avid mouths. Feathered, furred or scaled, they were soon gorged to satiety.

Still the swarms swept down-wind, reached the limit of their endurance and fell, showering the bare veld with a deluge of bright, brittle wings. Nor did the orgy cease even when the storm, of which it was the precursor, broke in black fury over a thirsty earth and drenched glutton and victim alike.

The negligible few who so far had escaped the massacre were still seeking their complementary mates; even under the threatening beaks of hungry fowl they touched and retouched, careless of the hovering fate above them, intent only upon the fulfilment of their own destiny: living exemplars of the theory—of which Man's life is the antithesis—that love is stronger than death.

"Insects, like man," says Wheeler, "have three fundamental appetites: hunger, sex (position and possession) and fear, or avoidance (negative and avertive").

Study of the higher families of the Termite world will reveal an error in this statement. They have no fear.

Darkness fell, as if to give the few survivors a last chance. One would like to think that the same Power which decreed the time of the alates' flighting had, at least, that forlorn hope in view, even if the forces of Nature were to prove, eventually, too strong to admit of its fulfilment.

Thus, Life born of a miracle, perpetuated by others even more incomprehensible, developed by months of more than human devotion in which still further marvels were revealed, and tending, we may be sure, towards a definite purpose, finishes in premature and complete annihilation.

The profligacy of Nature is a commonplace, but here we have a culture older than Man's, and in some respects infinitely superior to his, to which She is so violently antagonistic that the defiant survival of the Termite is conspicuous among the many wonders of its life.

If the Termite has any conception of a merciful God—and who shall say he has not?—it cannot well be consonant with the Laws of Nature, which decree such senseless ferocity employed to the sole end of destroying those whom God has made.

But I think that He is on the side of the Termites.

CHAPTER XII

IN THE VALLEY

"It can be clearly shown that the most wonderful instincts with which we are acquainted, namely, those of the hive-bee and of many ants, could not possibly have been acquired by habit."

—Darwin.
Origin of Species.

THERE was no originality in my idea of watching the Termites at work, at night, through an inset pane of clear glass; Escherich had done it in Eritrea before me. Like him, I found no difficulty in shearing away with a cross-cut saw a section of the castle, which my foremen, Bill and Joe, had been told to leave alone. It was one of the few remaining in the valley, and since our arrival the Termites, if the natives were to be believed, were building no mounds of any sort.

And this broad, circular castle might well have been the home of Cilla, Nympha and Miles: so at least it pleased me to think.

When I asked my head induna, N'hlutunkungu—otherwise, "Hill of the Mist"—the reason why no more castles were rising, he shook his white head, surmounted by the ebony ring of chieftainship, and told me a tale of a great mamba. He was, he said, the father of all mambas and lived, feared by everyone, in the hollowed site of an abandoned Termite city.

He it was who had told the Termites to construct no more castles, because Man would destroy them. A quaint conceit, as fanciful as my own imagery.

Out of consideration for the dwellers in the City I had chosen, my experiment was not made until the beginning of the rainy season and the first flighting of the alates had taken place. That followed after a few days of intensely hot winds, when the temperature rose to 130° Fahrenheit in the shade at nine o'clock in the morning. Daily, at noon, the sky grew overcast: black and threatening banks of clouds arose in the south-west, but still the rain held off.

At last there came, heralded by great masses of cumuli rising above the western precipices, shot through by vivid flashes of intermittent lightning, the first heavy shower of the year. For some days past there had been weird noises within the City, which, rightly or wrongly, I interpreted as forecasting the annual flight.

At four in the afternoon I stood in the rain and watched the citadel. Luck was with me, for presently a hole appeared at my feet which was at once ringed by the red-brown mandibles of Major Soldiers. Twenty or more exits from the soil must have been forced at the same moment, within a radius of fifty yards of the castle, for suddenly streams of alates flowed out into the air and took to flight; they pushed their way through the circle of jaws that ringed the different outlets like the waving tentacles of a sea anemone.

Some, flying high, were blown away by the cool wind that came, in gusts, with the rain: others, shed-

ding their wings at once, ran about, excitedly, at my feet. (In his equipment with wings which are deciduous and can be discarded at well-defined sutures, the Termite is unique in the world of insects.)

At this stage, according to accepted authority, they should have used their eyes or scent to find their mates, but they did not appear to me to have any sense of sight whatsoever; the faceted eyes with which Royalties are provided being, in my opinion, and as many experiments have proved, of no practical use to them. Nor have I ever encountered the "sweet-smelling odour" with which romanticists have invested them during these bridal flights.

Moreover, it has not yet been proved that the alates possess glands capable of producing such an odour, or one which is distinguishable by man; in any case, the psychic powers with which they are endowed would render such an attribute entirely superfluous.

The ground on which I stood was free of grass or herbage: there were no enemies in sight. But as I looked carefully around the patch of bare ground surrounding the citadel, a large female scorpion sauntered from the shelter of a stone to investigate the scores of alates who had dropped their wings and who were scurrying over the surface. She bore a cargo of young on her back, who quickly disembarked and chased the restless nymphs. A stick ended all their careers: thereafter the terrain was safe, and though ominous rustlings came from the grass near-by, one could watch the movements of the alates undisturbed.

Some, wingless, essayed to re-enter their home, but the jaws of the soldiers forbade it; others, more enterprising, after resting awhile, crept about touching each other with questioning antennæ. The females were easily distinguished by their habit of carrying their rear elevation hoisted well above the normal; they looked like so many film stars entering a studio. The antics of the males following them heightened the human parallel.

But the analogy failed in the fact that many of the ladies disdained the attentions of obviously eligible suitors; yet they were certainly using the intelligence which systematists deny them, in their selection of a husband. What puzzled me was why they should refuse any.

They touched some of the males, found them distasteful, and went on their way in search of the perfect Prince. Not that the claimants for their favours were easily discouraged. A manifestly attractive Princess had sometimes as many as six running after her, keeping in touch one with another and strung together like animated vertebræ. But always the antennæ of the foremost played over the person of the lady he proposed to violate at the first opportunity. Irresponsive, with curious self-restraint, she shook them off at last, and went on alone in her optimistic quest; a comedy of Natural selection, arbitrarily confined to a single species before one's very eyes.

Finally—in pursuance of my phantasy—one who might well have been Imago, found, at last, one of the opposite sex with adequate appeal. She halted, cocked her tail in the air as if exhibiting her graces—

again the human touch—stood vibrating with emotion while her ardent suitor caressed her, and plainly accepted him. Then they wandered off together into cover to seek a new home.

It is remarkable that for the last few days before the annual fighting, the adventurers of both sexes are feverishly impatient to go forth and face the light of day. Until they have succeeded in finding their destined husbands they seem wholly indifferent to the change of environment, and the sudden revulsion from total darkness produces no effect upon them. Yet, no sooner have they selected their life companion than by mutual agreement their immediate ambition is to return to the cryptobiotic habits of their childhood.

* * * * *

When a section of the castle had been carefully cut out by two natives and a double-handed saw, a wave of hot, damp air floated away and it was seen that the City, down to ground level, was clear of alates. The rest of the population disappeared gradually, the Workers running off by way of the many passages, the Soldiers following in a much more dignified fashion. The clay roof of one of the largest gardens—the size of a soup-plate—was prised off and in its place a pane of window-glass, a foot square, was inset at an angle of forty-five degrees and plastered round the edges with wet clay.

There was no sign of the Royal Cell; it may have been hidden six or sixteen feet away; there have been examples of even more remote concealment of

Royalty and excavations as big as a house have been made in vain attempts to find it.

For an hour there was no sign of life about the desegregated City; either the citizens were awaiting instructions or taking counsel together. Then they returned methodically to inspect the many breaches of the walls.

The Major Workers came first, accompanied and guarded by Minor Soldiers, all of the former carrying a pellet of earth in their mouths. They dropped it in position, others moistened it with saliva and the repair work was soon well in hand. Then—and not till then—did the Major Soldiers put in an appearance and relieve the Minor warriors, who went off, presumably, to their traffic-control or police duties. At no time, that evening, were any of the Minor Workers visible; they seemed exempt from repair work, certainly on that occasion. This order of organisation of repair gangs never varied when similar experiments were carried out.

At dusk a canvas ground-sheet was thrown over the citadel, completely covering it, and the termites were left to their own devices. There followed a remarkable illustration of the workings of their individual or collective minds. That ground-sheet, weighted by large stones to prevent its dislodgment by storms, remained untouched by Termites throughout the whole of the summer. Yet a fragment of the same material placed, by way of a test, on a monticule two hundred yards away was devoured in a single night. It was as if an order had gone forth saying: "It is serving a useful purpose: let it alone."

It was plain, when I next inspected the citadel, at midnight, that the thousands of Workers employed on the repairs were chiefly concerned in shutting out the light as quickly as possible, for the clay curtains they were putting up were thin and brittle; I knew that they would be reinforced later. At dawn, next day, every breach had been closed; my pane of glass was dimmed with the moisture and at its lower edge a film of clay was rising from the bottom over the inner surface.

It was obvious that if my observations were to be of any value, it would be necessary to remove the glass at intervals, clean and replace it. And that was exactly what happened. But within a few hours of its replacement the Termites were at work on it again. I made it a rule to draw away the ground-sheet every evening, when, by the help of a powerful electric torch, I learnt a good deal of what was going on in the City.

I found, most unexpectedly—though Escherich records a somewhat similar experience in Eritrea—that none of the castes showed any reaction to the electric light; possibly they may have known I was a friend. For, although they must have been perfectly well aware of my proximity, they went about their business undisturbed. My field of vision was, of necessity, circumscribed, and, at first, I could only see a mushroom garden supported by beams of compost and inclining at an angle following the line of the castle surface. At first it had few occupants. They grew in number gradually, until groups of nymphs could be discerned through the glass dimly, almost covering

the field. Although at that distance, by that medium, I could not distinguish the tiny nodules they were eating, I knew that I was looking at the miracle of the inexhaustible mushrooms, of which Dr. Claude Fuller wrote: "This is the complex and to us inexplicable phase of mushroom culture by termites." In other words, mushrooms which grow as fast as they are eaten.

It is difficult to draw a comparison between these fungi and the ordinary vegetable diet of human beings or to present a parallel instance to this everlasting reproduction.* A simile might be found, perhaps, in the conception of a terrestrial and edible mushroom, which renewed perpetually, not only its stipe, but its crown.

We know that the genus *O. badius* renews his fungus spawn when it is exhausted, but *T. natalensis* follows no such strategy; yet no one has ever reported a garden deserted by them. Bugnion holds that the conidia of at least two kinds of fungi—*Volvaria eurihiza* and *Xyglaria nigripes*, pass through the termites' and are designedly sown by simple evacuation. But both soil and mycelium must become worn out in time. The problem, therefore, arises as to when and where the Workers know the spawn should be replanted.

Swarms of nymphs of the third and fourth instar soon gathered in the fields: for some abstruse reason neither elder nor younger specimens were visible. Minor Soldiers and a few Workers moved backwards and forwards between them; only occasionally did a Major Warrior stalk austere through the throng,

wagging his great head as he made for the outskirts of the garden.

Two streams of Workers of both castes, flowing in opposite directions, were busy at some invisible task, probably strengthening the defences where they had been broken down by me. For some unknown cause, work had been abandoned on my pane of glass; the clay curtain had not risen more than a couple of inches from the bottom. It occurred to me that either their "instinct" or "inherited reflexes" were at fault. And that well might be, for neither those Workers nor their billions of ancestors could have come in contact with a material like glass, in all their countless existences.

Yet these perverted insects, after due deliberation, began to defy all the conventional theories of science by reversing their ordinary method of building. Finding, presumably, that their grains of material would not stick on the glass of their own accord, they first dropped a spot of fluid cement on it before placing the "brick" in position. After that triumph of ingenuity the screen must have risen rapidly, for in twenty-four hours it was impenetrable by light. Then it had to be cut out with a sharp knife, cleaned and put back in position. No sooner was that done than the Termites, without hesitation, recommenced to cover it.

So indifferent were the citizens to my torch that they appeared to make no alteration in their ordinary working methods whilst being watched. In its full glare, Soldiers accosted Workers and solicited food from them. Sometimes two would meet, come to a

standstill and hold converse—massaging and stroking—the antennæ of each playing over the body of his or her friend. In no case did I see Soldiers being massaged in like manner: they, especially the Major caste, ambling along with their enormous heads and awkward gaits, seemed to have no appeal to the Workers who gave them right-of-way, long before they could make contact with each other.

* * * * *

Because we had found no trace of the Royal Cell, it did not follow that the Queen was not near at hand when first we broke into the City. Later, I knew, any further search would be useless. Either she would have been removed to a distance or her cell entrances would have been blocked. Indeed, the walling-up of the Royal apartment in times of stress by the Workers of highly developed communities has never been questioned. Among certain species, the Queen, being mobile, is whisked away through secret passages at the first sign of danger; in others she takes the initiative and makes herself scarce at the note of alarm.

But, short of breaking down the cell of a huge, physogastric Queen, immured behind more or less solid partitions, there would appear to be no means of transferring her to another spot, safe from any threatened catastrophe; the entrances and exits are spaced so exactly that only the comparatively minute Soldiers and Workers can pass through them. More than one authority, however, has reported that by some inexplicable process these enormous unwieldy

bodies of the Queens, ten thousand times bigger than their doorways, have been transported to some unknown destination, without breaking down the cell or widening the doors.

Logically, this would appear to our finite intelligence little less marvellous than, taken literally, the camel and needle concept. My induna, N'hlutunkungu, however, affected to see nothing extraordinary about it; he said it was a small thing compared to the marvels of the white man who could fly through the air and run about in horseless carriages. When I suggested, in the vernacular, that much time and labour would have to be expended in finding a Queen with whom to make a test, he reassured me. A Zulu witch-doctor of his acquaintance would see to that.

His friend, a bent old greybeard, with a face like a dried goat-skin, arrived a few days later; he was garbed in a skin girdle, some monkey pelts were round his neck; bones and a variety of teeth were strung about him. When my needs were explained to him, he crawled about the camp on his stomach for ten minutes, listened to the voices of the earth and, finally, sat up ten yards from the flap of my tent. Then he removed his horn snuff-spoon from a pendulous ear, tapped on the ground with it and remarked, "That which the N'koos seeks lies but the length of a hoe's haft below."

Working with picks and shovels we found the Queen in her cell as he said, four feet from the surface. She was over three inches long, an inch in diameter, and must have been the mother of a strong

and healthy community. She was lifted carefully and placed, unhurt, on a sheet of thick cardboard at the bottom of an empty five-pound biscuit-tin, previously riddled like a sieve with holes driven by a two-inch nail; in diameter they were less than a cigarette's; the cavity was then closed with the least possible disturbance of the City. Lastly, the tin with its tenant covered with a damp sack was left on the bare ground between my tent and the refilled excavation.

The magician was fed, supplied with tobacco and instructed to watch the tin day and night and allow no man to approach it. Next morning the Queen lay torpidly where we had left her; the soothsayer when awakened merely remarking, "Have no fear, N'koos; they will come."

Twenty-four hours afterwards red termite earth had appeared around the lower rim of the tin—covered ways had been carried through the lower holes and along the cardboard to form an oval-shaped fence round the incumbent Queen: there were indications that she had been fed.

On the following morning very little more work had been attempted and I suggested to the ancient that the insects had left their Ruler to her fate. His wizened face cracked into a senile smile. "Patience," he said; "the N'koos does not know the Termite folk; they are taking counsel together."

At dawn on the third day the Queen had vanished.

And because one does not question the good faith of the raw untutored Zulu, I knew that neither the old man nor any of his tribe had a hand in the miracle.

CHAPTER XIII

SYMBIOTS AND OTHERS

"We die too soon because we are poisoned
by bad intestinal bacilli."

—Metchnikoff.

IT is a sad and humiliating reflection that Man should not be consulted when he is called upon to act as host to a number of autochthones: bacterial inmates over which he has no control. That even the holiest and most erudite among us should be subject to unseen forces engineered by mysterious internal organisms, or that we should be at the mercy of our cells, must appear nothing short of an outrage to those who cherish convictions of our superiority over all created things, and the "sanctity of human life."

Many persons are still as sceptical of the strife waged within us as they were in the early days of Louis Pasteur; they are most difficult to convince that from the day of our birth we begin to die. How then can it be expected that the layman should believe, off-hand, the proven fact that white blood corpuscles swarm in blood vessels massed like soldiers to swallow dangerous microbes when they invade us—"this white cell militia, these phagocyte minute men," of Metchnikoff.

But if there be any who doubt the existence of this biological phenomenon, a census of their interior tenants can easily be obtained. I cannot identify any

of my own, but they appear to be sufficiently interesting. And I think that had the ancients been aware of theirs they might have improved upon their somewhat crude method of reminding themselves and their friends of their mortality. In place of skulls and skeletons at their feasts, a chart showing the variety of life within them would have been equally convincing and possibly more effective.

If it be true that Man invariably overeats, a similar procedure might well be followed to-day. It would not necessarily engender an inferiority complex—most of us being, happily, above that failing: nor, on the other hand, would the ownership of any rare variety of microbe be regarded, *ipso facto*, as a special distinction. Even if its aims and objects were fully understood. Which seems unlikely.

No excuse is made for this digression, because it brings us within measurable distance of contrasting the types of parasitic in-dwellers of the Termite and our own, and of drawing a remarkable distinction between the two, much to our disadvantage.

If Metchnikoff's contention be correct, we are only too prone to attacks by injurious organisms, even though their insidious approaches or origins are little comprehended. I think I am correct in saying that all the anatomists who have had their will of the Termite have failed to find potentially injurious parasites within them. There have been many who have tried. Indeed, the world of research appears to be more interested in the insides of the lower forms of beasts—as we term them—and insects than in our own, probably because the former have no means of protesting

against the violation of their interiors to satisfy the curiosity of ambitious bacteriologists. Whereas Man, secure in his conviction that he is constructed in the image of a God, prefers to rely on that supposition: shelves all responsibility for his own composition, and deprecates, if not strongly resents, unless impelled by disease or the fear of impending dissolution, any revelation of the infinity of micro-organisms by which he is inhabited.

Imagine—shall we say?—some famous profiteer or equally renowned South African millionaire, all aglitter with purchased honours, expecting and receiving the cringing homage of the market-place, the uncritical adulation of his fellows, being at the mercy of some obscure bug. It seems incredible. Yet . . . a tiny micro-organism sponsors a minute blood-clot, which races to his brain: and that is the end of him. His scheming, his experience—such as it was—is at an end; his knowledge and his virtues—if any—are as last winter's snows.

Synagogue, cathedral, mosque or church may resound with lamentations, filled with mourning—and expectant heirs—but all the pæans of the latter addressed to his domestic God, by virtue of Moses, Christ or Mohammed, will not undo the work of that invisible, insignificant microbe.

For purposes of comparison, and reverting to a less distasteful subject, let us consider the denizen of the dog. The louse (*Trichodectus canis*) by which he is sometimes and unfortunately infested is the host of a larval parasitic worm (*Cestode*).

The louse is swallowed by the dog, who knows no

better, and the Cestode develops into a tapeworm; the same cycle is in evidence where the flea is the host. Everyone knows how plague is carried. Water-snails, water-beetles, mayflies and midges have their own parasites: so do grasshoppers, cockroaches and most of the insect world. Curious worms known as *Acanthocephala* living when mature in the intestines of vertebrates are represented by several species whose larvæ are parasites of insects. Quite apart from these easily identified forms of life, minute unicellular organisms known as Protozoa infest the intestines of animals and insects alike.

Termites, in common with many graminivorous animals, are infested in a greater or lesser degree with the Infusoria or Protozoa peculiar to their manner of diet. The classification of these has been studied by many scientists since, in 1856, they were first investigated by Lepes. They are found in the greatest profusion in the Soldier and Worker castes.

But, as an instance of specialisation, the micro-organisms which either impede or assist the digestive machinery of Man differ vastly from those inhabiting the Termite. So far as can be determined—and Imms, the eminent authority on the subject, confirms this view—the Infusoria of the Termite are in no way inimical to the interests of their hosts. On the contrary, they wage no personal or internecine war in the recesses of his being: they are true Symbiots, who help him to thrive on wood.

"Animals," remarks Wheeler, "as high in the scale as insects, must find it difficult or impossible to digest crude cellulose." Man, who claims to be even higher

in the scale of life, would find it still more difficult. Yet the Termite accomplishes it as part of his daily life and as a matter of course by means of the symbiosis which distinguishes the relationship between lodger and host: the difference between symbiots and true parasites being that the latter batten on their hosts, whereas the former are purely beneficial.

Buscalioni and Gomes Carpenter (1910) and Imms (1919) have established that "many of the flagellate Protozoa living in the intestines of termites are not parasites but symbiots, obtaining food for themselves and digesting it for the benefit also of the wood-eating insects which harbour them. It is only among termites of wood-eating habits that these Protozoa abound; the wood broken up by the mandibles and gizzard of a termite is in a condition of minute fragments and particles when it reaches the hind gut, where, as Imms observes, it gradually becomes taken up and absorbed by the numerous intestinal Protozoa." There it undergoes digestion and when ejected from the bodies of the Protozoa, much of it is capable of being assimilated as food by the host termite. Thus, pre-digested nourishment appears to be passed forward from the hind gut into the termite's stomach for absorption.

Many of the flagellate Protozoa with which they are endowed are not found in any other animal, and some species are unique in the ownership of innumerable flagella, numbering in some instances hundreds of thousands as opposed to the meagre half-dozen or so exhibited by free-living flagellates in other

animals; many of the Termites' Protozoa have internal parasites of their own.

It is significant that in the more primitive families their presence is far more marked, and that cannibalism among them is as common as in our own. According to Kirby (1934) "the fluid contents of a wood-eating termite will be found upon examination under the microscope to be a seething mass of active Protozoa, spirochaetes and bacteria. In the region of the gut inhabited by the micro-organisms there generally are a few particles of wood that is not enclosed in the bodies of the Protozoa. Not all of these animals are xylophagous, however. Some species do not ingest solid food, but absorb dissolved organic nutrient material. A number obtain part or all of their nutriment by devouring other micro-organisms." This statement does not apply to the highly civilised family of *T. natalensis*.

The same authority is responsible for the statement that the active flagellates are passed directly from one termite to another "in some manner which is not clearly understood."

On the other hand, we learn from Hegh that in nature it is doubtful if there has been any transfer from one host to another: he remarks, however, that "the digestive processes of Termites are not understood." In this, at least, two Termitologists are in agreement.

Nevertheless, it is certain that the most advanced families are notably deficient in the number and variety of Protozoa they harbour; as they progressed in the scale of civilisation no doubt they eliminated

those which were of no use to them, retaining only those which were indispensable in pre-digesting their food for them. This has been proved by defaunating or depriving Termites of their protozoa, following which process, they die. Alternatively, if speedily re-infected they live indefinitely.

Apart from technicalities it is certain that they have evolved a perfect digestive system through the good offices of Symbiotic Protozoa. And that these, in preserving their hosts' health unimpaired for an incalculable period of time, have achieved a feat beyond the dreams and means of Man; one which should have more than a passing appeal to their suffering superiors of the upper world, who, devoid of such vicarious aids to their physical welfare, rarely live their lives untouched and unaffected by abdominal turmoil and revolt. And not only have they perfected the process of securing immunity from digestive disorders, but they have solved the secret of passing on their knowledge of the living preventive agent one to another. The assertion is based on evidence which cannot be questioned.

Possibly, after a few million years of research, we too will be blessed with cognisance of similar agents; when, even if the enzymes which at present afflict us have not been entirely eliminated, we shall nevertheless be in a position to take counter-measures against their unwelcome attentions when and if carried to excess. If such wisdom be acquired, in one sense at least we shall have profited by the example of the Termite.

ALL OVER AFRICA

"Owing to the fact that the more the different species are studied the more the differences which exist between the economy of one and another are seen to be, no general idea of them can be gathered from the study of a single species."

—Claude Fuller.

NOT one but many books would be needed to convey even a general view of Termite life in Africa, where the acme of development has been attained, and where the first families are represented by more than four hundred species. I have but glanced at a few distributed over a very small area of the continent.

In the Congo country alone are fields of research almost untouched and many unidentified types, a better knowledge of which would add considerably to our slowly accumulating store of facts concerning these denizens of the tropics. Until these have been investigated it is impossible to accept the verdict of the dogmatists who assert, superficially, that the Termite has reached the end of his evolution.

The heat and humidity of the Congo basin have ensured that in no other part of Africa can be seen such an amazing diversity of constructional effort; so far as the numerical strength of the architects is

concerned, the human mind is incapable of visualising any equivalent in terms of figures. As for examples of their art, one sees them in soaring castles, towers, cathedral spires rising to undreamt-of heights, mounds and umbrella-shaped edifices, amorphous masses of varicoloured earth and grotesquely-fashioned triplicated mushrooms suggestive of a fungologist's nightmare.

Perhaps the most striking of all, because of the symmetry of its lines, is the home of *T. bellicosus*, a palace among Termite dwellings. In the beginning it rises from the ground in a series of pointed cones, more or less grouped in circular formation and rising vertically until a foot or two high; the soil at the bases of these small sugar-loaves gradually ascends, forming a wide foundation, the extent of which more or less indicate the height of the projected castle. The space between the cones is then levelly and systematically filled in. More pinnacles appear on the slopes of the castle as it rises, and the top of the central tower is rounded off into a perfectly shaped dome.

Lastly, the clay scaffolding is either removed or left *in situ*, in which case more filling-in is necessary. Thus, the castle, flanked by its smaller protective pinnacles, is amalgamated into a perfect whole, the summit of the main dome being twelve feet or so from the ground.

The life history of *T. bellicosus* differs in few respects from that of his cousin, *T. natalensis*; he is, as his name implies, a famous fighter and the most warlike of all his race. Contemptuous of the size or

strength of his opponent, the Soldier of this species will grip the skin of elephant or man, or anyone who disturbs him, with the same suicidal indifference to the result.

"The interior economy of the City appears to be more systematised than that of his relative, though the general principle is the same. The Royal Cell is in the centre of the City, and within a radius of two feet is a perfect labyrinth of guard-rooms, waiting-rooms, the quarters of soldiers and others. Beyond these, as always, are the nurseries and store-houses. Farthest of all from the Royal apartment are the mushroom gardens, which follow upwards the exterior line of the citadel. Between these and the outer world is a bewildering maze of smooth, cylindrical, inclined galleries, some of them a foot or more in diameter, dipping when they reach ground level and leading to unknown distances. Spiral staircases wind upwards towards the summit of the citadel and the spacious, empty hall under the dome, the use and existence of which are an unsolved mystery.

Inwardly, this perplexing hall is a perfect specimen of inspired architecture. Smeathman likens it to the nave of a cathedral, complete with Gothic arches, two or three feet in height, giving strength, solidity and support to the arched roof; groined walls heighten the resemblance, and below, scientifically constructed bridges afford easier and quicker access to the lower regions.

When, one hundred and fifty years ago, Smeathman returned to England and gave people to understand that the architects who designed these

masterpieces and the artificers who constructed them were stone-blind, the English public were frankly incredulous; the idea of these "insignificant insects" excelling the work of Man being too much for Georgian mentality: it is on record that the famous naturalist's scientific friends were equally sceptical.

"Those wonderful buildings," he wrote to the Royal Society, "constructed upon so different a plan from anything else upon the earth, and so complicated that I cannot find words equal to the task."

He would have found it almost as difficult to-day to convince the majority of 'the actuality of the Termites' miracles.

I do not doubt that he had some of these sceptics in mind when, writing of the alate caste of this genus, he remarked, almost Bolshevistically, "These might very appositely be called the nobility and gentry, for they neither labour nor toil nor fight, being quite incapable of either and almost of self-defence."

Smeathman's experience of the aristocracy of those days must have been an unfortunate one, and the comparison he draws is certainly open to criticism. But conditions have altered since his time, and as at least one of the classes of which he held so poor an opinion is almost extinct, one need not stress an ungracious epitaph.

The nurseries of *Bellicosus* have a peculiar property carried to a stage of perfection unattained by other species. They are lined with a soft, felty substance, resembling, somewhat the padding of a trap-door spider's home, so that the young and tender nymphs can wander scatheless in their wadded

cells. It is not produced, of course, in the same way, by spinning; its source indeed is problematical, like so many other riddles connected with the Termite, but it is held to be proctodæal.

As always, the entrances to the Royal Cell are so small that neither King nor Queen can possibly leave it; both are prisoners for life, but as the latter grows in bulk, the Workers lift the inverted saucer-like ceiling to give her more head-room, and widen the floor space. No record has been kept of the size of the various Queens found in excavated Cities, but, when fully developed, she is usually twenty thousand times the size of the Worker, and more than one painstaking observer has estimated her daily output of eggs at eighty thousand. My own specimen of defunct royalty exceeds three inches in length with a girth one and a half inches in diameter, but measurements of four inches are not uncommon. Bosman, writing of the king in 1700, described him as being as large as a crayfish. This seems to me an exaggeration only comparable to that of Pliny, who likened his "ants" to cats.

Bellicosus is quite capable of abandoning his enormous castles and living entirely underground, if and when inconvenienced by the presence of Man. And the alternative he adopts, considered in conjunction with his ability as an architect and the magnitude of his building operations is, to me, an extraordinary example of the exercise of free will directed towards his own interests.

He has been reported in the Northern Transvaal, but his favourite habitat is well within the Tropic of Cancer; the islands of Zanzibar and Pemba know him

well but are ignorant of the means whereby he gained them; he is no stranger to Abyssinia, Somaliland, Eritrea and the Sudan. Incidentally, it may here be noted that although T. J. Savage does not argue that *Bellicosus* eats wood, both the late Claude Fuller and myself have found him doing so. No hard-and-fast conclusions can be drawn in any case; the harmless grass-eating variety of to-day, metaphorically speaking, may be found to-morrow devouring timber, ivory and waterproof sheets.

But *Bellicosus* affords an outstanding instance of the perfection to which termite culture has been brought in the tropics, where men are scarce and their absence has encouraged him to further efforts of self-expression. And not him alone. Another species of a very inferior family, *Hodotermes viarium*, who must not be confused with the Driver or Red Soldier surface ant, has gone a long way on the road of specialisation.

He is not a wood-eater and he is not blind; he is a blood brother of my neighbours on the Mambula River. And since no writer on the subject of Termites can withhold acknowledgement of his indebtedness to Smeathman, his account of this species in the tropics is quoted in full. After describing how, in the neighbourhood of Sierra Leone, he observed them marching from a hole in the ground, five inches in diameter, he writes:

"At a short distance from the hole they divided into two streams or columns of some twelve or fifteen abreast, which united again and descended into another subterranean passage some few paces farther

on. For over an hour there was no diminution in numbers or paces of the marching army. The bulk of the procession consisted of Labourers among which were distributed a few Soldiers, while, as if for the column's protection, numerous Soldiers occupied a position as sentinels on either side all along the line of march, having climbed up and stationed themselves for such purpose on the leaves of the neighbouring herbage. . . ." These marching Termites were considerably larger than the hill-constructing *T. bellicosus*.

Later he watched them at work repairing a breach intentionally made by him. "During the progress of these repairs the few soldiers that remained to supervise the works were observed at intervals of a minute or two to raise their heads and strike the walls of the building in such a manner as to make a distinct vibrating sound.

"This was immediately answered by a loud hiss, which apparently came from all the labourers who immediately addressed themselves to their task with redoubled energy.

"Should the onslaught on the termitary be renewed the Workers all vanish again within a few seconds and the Soldiers rush out in numbers to do battle with the enemy as valiantly and vindictively as before."

As I happened to be in Sierra Leone on my way in a transport to the Persian Gulf in 1916, I mentioned the wonderful organisation of *T. bellicosus* to a resident. He said Smeathman's account was an understatement; he himself had seen Soldiers, evidently elected

generals, perched on the top of grass stalks two feet high, directing their troops and waving them on to victory. I repeat the tale for what it is worth; I have heard it a dozen times, all over the world.

It may be a coincidence, or perhaps some thoughtful nigger may have watched *Bellicosus* at work and adopted his methods. It is certain that when working in gangs anywhere in Africa the natives use the same vocal accompaniment to their concerted action. At the word from the foreman or induna a dozen picks or hoes will fall like flails, the wielder of each emitting a loud suspiration with each blow.

West Africa, especially in the Congo and Senegal country, is renowned for another type of builder, identified by Smeathman—and no one else—either as *T. mordax* or *T. atrox*. Heigh mentions them as *Cubitermes fungifaber*, a fairly descriptive label. They are the masons of mushroom or umbrella nests of varying forms; it is safe to say that if Termites were classified according to their building ability, these would be near the top of the list.

They construct a perpendicular cylindrical column two or three feet high composed of very tough black or brown soil, a foot or so thick; surmount it with a wide overhanging roof, and the result is the home of *Fungifaber*, comparable only to a gigantic mushroom. The pedestal or stipe is so resistant in texture that it is easier to break off at the base, where it is slightly thinner, than to fracture the column itself. Once upset, its late occupants begin forthwith to build another home at right angles to the fallen one.

Very little is known of their home life and domestic

arrangements. All one can say is that they lack, apparently, the complex organisation of the higher cultures. The interior of the pedestal and the column consists of innumerable cells, each with one or more connecting entrances. Some of the finest specimens are to be found in or at the edge of the jungle, notably in the Ituri forest.

Here lives, also, the rare and unidentified Termite who selects a tree in the jungle and proceeds to make the trunk waterproof. Working upwards from the ground he covers it with fringed and scalloped leaves of clay, hanging downwards and superimposed one over the next to a height of six or eight feet. It seems an extraordinary feat only explicable by the Termites' realisation of the heavy rainfall in the Ituri country and the necessity of guarding against it; this is the solution which occurs to Man; it is more than probable that the insects' is quite different.

Another species, *Subcrenulatus*, has allowed his imagination to run away with him, the result being a triple crown on top of his column, consisting of three umbrellas superimposed on the top. But *Eutermes aurivillii* in the Cameroons goes even farther. He, at least, cannot have in view protection from excessive rainfall; yet he builds a succession of stalkless and rounded mushrooms resting on each other. We know nothing about his reasons for doing so.

In the Gambia country are many types of umbrella builders. Their smaller structures in open country dot the landscape in exact imitation of vast mushroom fields; except for their darker hue and Gargantuan size they might well be mistaken for the edible

variety. They make excellent stools, if a trifle hard, on which to sit and rest. We know nothing of the economy of the Termite responsible for them.

In the Katanga district we again meet *T. natalensis*, who, disdaining concealment in that sparsely populated land, boldly builds citadels of ten or twelve feet high. Not the simple, single-towered mounds of the more temperate zones but tall, ribbed, and many-pinnacled castles towering above the landscape. Nearer Elizabethville are more mushroom-builders, and most impressive of all, the gigantic hills of *T. goliath*, the largest—as his name suggests—of all the Termites so far discovered. He favours also the Cameroons and Tanganyika. Because of the remoteness of his chosen resorts he is a little known species; there is nothing distinguished about his abodes beyond their enormous size. They are mostly amorphous hillocks, thirty or forty feet long, thrown together as it were and showing no attempt at ordered design or symmetry of line such as sometimes distinguishes his more lowly brethren's homes, to say nothing of his equals'.

But if, as is sometimes suspected, *T. goliath* has devoted to interior decoration and household utility the ideas he obviously lacks in exterior design he must be a wonderful animal. We know, at least, that he always leaves a wide open space above the Royal Cell, to allow for future expansion, and must therefore be blessed with a certain amount of foresight; the Cell itself is remarkable in that it is exquisitely fashioned and smoothly rounded; *Goliath* thrives among, and



AN UNIDENTIFIED SPECIES, N. RHODESIA
(Copyright, Major E. R. J. Peake)

has a decided liking for, the banana groves on the foothills of Mount Kilimanjaro.

It is on record (Casati) that the Soldiers are used as styptic agents by certain tribes on the west side of Lake Victoria in Tanganyika territory. In case of a wound causing heavy blood-flow they are carefully brought into contact with it, when their huge mandibles sink into the flesh on either side, bringing the edges together and shutting off the flow of blood. Either the body of the Soldier is severed at the thorax or he is allowed to remain *in situ*, as he is; until, presumably, he dies. In any case, the grip of the mandibles is not relaxed.

Whether it be that the size and strength of *T. goliath* render them indifferent to interlopers of smaller species, or whether they are following definite commands it is impossible to say, but it is certain that they exhibit a contemptuous tolerance of the tribes of their weaker brethren who sometimes take up their quarters in the giants' home. Colonies of these have been found, notably *M. incertus*, living amicably with their hosts, not as parasites but with a systematised scheme of housekeeping of their own. Nevertheless, they efface themselves when the Soldiers of their landlords come their way.

In Northern Nigeria and Senegambia are many varying types of Termite architecture ranging from sharp-pointed mounds twenty feet high, to columns of mushrooms, and smaller specimens of the latter broadcast over the veld. Nyasaland, Mozambique and the two Rhodesias are haunts of *T. goliath* and many other genera. Madagascar boasts a smaller

variety of the umbrella-makers and that enterprising insect *T. bellicosus* has found his way there, as elsewhere. In Tanganyika he excels all his other African performances by building the tallest and strongest castles.

Kenya is overrun with Termites from one end to the other. In addition to those already mentioned, is an unnamed variety living in huge unwieldy mounds in which smooth-lipped irregular cavities are sunk like holes in a sponge. In Somaliland are found extraordinary bulb-like buildings from which spring one or two funnels, great or small, for all the world like portions of giant retorts.

Somewhat similar examples are to be seen in Abyssinia, as well as some very beautiful specimens of unique architecture. Tall, narrow shafts, twenty feet high, rise straightly from the bulky mass of the City, half above, half underground. It is not known whether these columns are intended for ventilating shafts or for some other purpose, but they are wonderful specimens of Termite ingenuity and industry.

Truly, the whole of Abyssinia and Somaliland provides object lessons of Termite enterprise unknown in any other part of the world, if one excepts the bizarre architecture of the Congo. Burton, in his famous expedition to Harar (1856), mentioned some of them:

"Presently we came upon the Hills of the White Ants, a characteristic feature in this part of Africa. Here the land has the appearance of a Turkish cemetery on a grand scale: there, it seems like a city in ruins. In some places the pillars are truncated into a resemblance to beehives, in others they cluster

together, suggesting the idea of a portico; whilst many of them, veiled by trees, and overrun with gay creepers, look like the remains of sylvan altars. Generally, the hills are conical, and vary in height from four to twelve feet; they are counted by hundreds and the Somali account for the number by declaring that the insects abandon their home when dry and commence building another. The older erections are worn away, by wind and rain, to a thin, tapering spire and are frequently hollowed out and arched beneath by rats and ground squirrels. The substance, fine, yellow and glued by the secretions of the ant, is hard to break; it is pierced sieve-like, by a network of tiny shafts. I saw these hills for the first time in the Wadi Darkaynlay; in the interior they are larger than near the maritime regions."

The holocaust which accompanies the fighting of the alates in Gallaland and Abyssinia has no parallel as an example of the unrestrained ferocity of Nature. Not only do all the usual ground vermin take part in the orgy of gluttony, but every form of bird life gathers to the feast. Green, yellow and blue finches, hawk, egrets, duck, geese, teal, partridge are the first; cranes, adjutant birds and cormorants are not far behind; a foul, bald-headed, blue-necked vulture squatting over the City and jabbing at the insects as they fall over each other in handfuls to greet the light is no uncommon sight.

It is not as if this sudden upheaval of living manna were essential to the welfare of those who snatch at it so greedily, for there is no scarcity of terrestrial or aqueous food in the country where they thrive; the

birds and beasts must regard this annual massacre more as a Lord Mayor's banquet than in the light of everyday sustenance.

Pious and well-meaning travellers, in which category more than one author of Abyssinian adventure is included, profess to recognise a special dispensation of Providence in this annual exodus of the alates. They argue that the more they are eaten, the fewer will remain to damage their baggage and other effects. Or that God, foreseeing, paradoxically enough the result of His lack of foresight, ordained this method of destroying all but one in a million Termites, in order that tourists' camp-beds and property should not suffer.

But it seems to me there is something wrong in a theory which ascribes to the Deity the infamy of creating animals, which have a definite use and purpose in Nature, so that they should be ruthlessly destroyed before their life cycles had really commenced.

CHAPTER XV

THE HARVESTERS

"Instinct in the higher animals is chiefly a matter of acquirement. Language, cooking, wearing of garments and religion are examples. All things tend to become automatic in us as we grow older."

—Reid.

NOT only the uprights, struts and cross-pieces of my buildings on the Concession were vanishing, but the thatched roofs were being steadily removed. The walls were showing great ragged gaps, and, before long, it was obvious that another species, *Hodotermes mossambicus*, of the family of *Protermitidæ*, was attacking them in force. They are the lowest in the scale of Termite classification, but by no means the least intelligent. By strict attention to business they were carrying off my huts piecemeal before my eyes.

This main camp was in charge of the two white men, already mentioned, whom I remember after all these years simply as Joe and Bill; they belonged to the only type of colonist which can be prevailed upon to accept a life in what is known as the "Hell of the Thorns." Both were uncouth in manners and diction, of doubtful antecedents, but cheery and willing withal; both had "gone native," and singly or together were staunch upholders of the expedient

recommended by Job, when he declared: "Let him drink and forget his poverty and remember his misery no more."

I can refer to them now without risk of giving offence, because they followed this injunction so conscientiously that they are long past any criticism.

They were no strangers to the idiosyncrasies of the Termite, and during my absence from the camp their methods of controlling him—as they fondly imagined—included frequent doses of boiling water, drenches of paraffin and buckets of carbolic powder and other specifics, all of which were expensive and ineffective.

One sultry Sunday morning, when it had seemed good to Joe to remain in camp instead of visiting his black consort and parti-coloured progeny in their kraal, some miles away, he explained his views on the latest devastations, affecting, possibly, a concern he was far from feeling, because of my own interest in the authors thereof, which he could by no means understand.

For I had been at pains to convince him that these grass-eaters differed in many respects from the xylophagous Termites and had no connection with them.

"That there mess-hut hasn't lasted very long, anyway," he grumbled; "though me and Bill did all we could to kill the blighters. Better blow up their mound, hadn't yer?"

I told him they were another breed altogether; that the "mound," as he called it, did not belong to them and was not to be disturbed, and suggested that

he should catch one of the grass-cutters and observe it under the microscope.

"They're running about like ants," he said on his return with a Worker specimen; "thought they only worked at night."

"This sort works in the day-time. Look, they're much larger than the others, and, as you see, have eyes."

"Come to think of it, I've seen them in the Free State," he volunteered. "'Harvester ants,' they call them. They're eating out all the farmers up there."

"I know. They are Termites, nevertheless, and no relation to ants. We'll build the next huts with galvanised iron bases. That will stop their pranks." As, of course, it did.

Hodotermes, of several genera, are well known and feared in the uplands of South Africa; in the north of the Free State they are, as Joe remarked, very destructive. They are deeply pigmented and belong to one of the few families possessed of faceted eyes, and, although living in subterranean homes, have retained to some extent the faculty of using them. Despite his gift of sight, he does not obtrude his presence in South Africa by marching in the open as does his Congo relative.

No one has hit upon a tenable theory as to how Hodotermes has survived the enmity of other animals during the ages of their semi-terrestrial existence. It is surmised, however, that their habit of working above ground chiefly by night and strongly guarded has contributed to their success. Still, though some-

what larger, they are as weak and unprotected, physically, as their high-born relatives, the Termes, who never leave the shelter of their cities, tunnels or covered ways.

When *H. mossambicus* does carry out a daylight raid, he falls an easy prey to surface ants, wasps, spiders and scorpions, in and out of season and in spite of his Soldier guards. But by means of prolific supplementary queens the wastage in population is easily remedied; he appears indifferent to an appalling death-rate and is increasing in strength all over Africa.

He does not construct castles, and only very rarely indicates his presence underground by embryonic mounds; thus, Man finds the difficulty of locating and exterminating him an insuperable problem. Moreover, *H. mossambicus* is more or less an Ishmaelite, and is by no means attached to a permanent abiding-place. When, as sometimes happens, his home is raided, he hustles his queen—or queens—away through artfully contrived one-way passages, excavated beforehand with a view to such an emergency.

Although he is deficient in the engineering and scientific knowledge of the Termes, he is blessed, nevertheless, with enough intelligence to make him feared and detested by Man. More so, perhaps, than any member of the Termite families, and certainly in South Africa. For one thing, he can carry on his depredations under more arid conditions than any of his relatives in the sub-continent. Hence, we have Dr. Naude writing: "Available evidence supports the

impression that while prolonged drought would appear to favour the increase of the 'harvester' population, and no doubt that of the 'fungus-grower' . . ." etc., etc.

No other authority, perhaps, would agree with this thesis as applied to the "fungus-growers," but as divergence of opinion among termitologists is the rule and not the exception, it is worthy of note as an example of the many contradictory arguments put forth occasionally where one specific instance is in dispute; my own experience being that the mushroom cultivators, though much more advanced in the science of moisture conservation, require far damper conditions than do their lowly relatives, the harvesters, who have adapted themselves to the very dry surroundings of the territory under notice.

At the moment of writing *H. mossambicus* has become a menace in many portions of the Orange Free State, but here again, Man is chiefly, if indirectly, responsible. The country, until recent years very sparsely populated, has become more settled. As a greater acreage of crop-land has been opened up, he has increased in number proportionate to the food provided by intensive cultivation. For *Hodotermes* eats indiscriminately lucerne, barley, oats, dried grass or hay, live roots and dead or decaying herbs; his scavenging propensities may be recognised . . . and pardoned: his assaults on crops certainly are not. For many years farmers have been complaining bitterly of his ravages, oblivious to the authorities' contention that they are largely due to overstocking and the wholesale destruction of bird life which is a

concomitant of our civilisation, and a suicidal policy for farmers to adopt.

Man now carries on an unequal contest with the insect, and so far has arrived at no practical means of suppressing *Hodotermes*. And, as if they did not in themselves present a sufficiently grave problem, they have for some unintelligible reason been joined in this territory by hosts of other tribes. For it has been reported officially that "although in the Northern Free State trees and shrubs are virtually absent, yet this area supports an amazing population of *Termes latericus* and *T. badius*, in addition to and very often on the same land as *Hodotermes*."

The difficulty of dealing with the last named is further enhanced by the queer irregularity of their foraging raids. For weeks they will remain quiescent, and give no sign of their existence. Then, when the landowner is congratulating himself on having disposed of them, they will reappear in overwhelming numbers, devour all available fodder and promptly remove themselves to an unknown distance. One knows the time of year when a locust invasion may be expected: when cutworms and other pests of the veld will demonstrate their part in the scheme of things, but no man can foretell the coming of *H. mossambicus*.

It is a very real warfare which is raging between him and Man to-day. So far the policy of the latter has been devoted to attempts to suppress the former by means of poison dusts, gas or bait. But as the Report quoted records regretfully, "The Harvester takes very well to bait, but as there is no evidence

of its effects, the prospects of the bait distributor are by no means promising." They are not improved by the fact that seldom, if ever, can the cities of the harvester be traced.

Further, unless his reasoning powers are considerably less than those of Termes, or unless he fails to profit by experience or the warning conveyed to him by his God—which seems unlikely—he will certainly refrain from accepting baits, in future, however enticing they may appear.

Whether there be any affinity, or sympathy, between Hodotermes and the black man is a moot point, but I found it extraordinary that the huts of my natives appeared to be immune to their attack. The valley was dotted with them, but none showed any signs of the dreaded clay tunnels. It may be that the acrid smoke which is an outstanding feature of a native's hut—which has no chimney—discourages the Termite of any variety from demonstrating his presence. Dr. Claude Fuller, whose reputation as a Termitologist is second to none, hazards a guess that the continual movement within the hut explains their abstinence, but I find the explanation unconvincing because there is no vibration in the cow-dung floors, always in evidence. In any case, the life of the Termite is so shrouded in mystery that another problem makes no difference. The fact remains that as a tree growing out of a Termite's citadel is, for some occult reason, held sacred by the in-dwellers, so does a native hut remain unscathed.

No such forbearance was noticeable in my own buildings in any of the camps. As soon as the material

used had been sufficiently seasoned all were methodically exploited. The system employed by *Hodotermes* was simple and his organisation marvellous. A few of the big-eyed foragers walked about the grass walls in broad daylight, inspected them carefully, nipped off a fragment or two by way of testing them and retired. This procedure would be repeated until it was decided that the time was suitable and the grass ripe. At eventime, and departing from their old-established custom of stopping work at dusk, the onslaught on the tightly packed bundles forming the sides would begin. It continued throughout the night, thousands of Workers sawing each blade into inch-long pieces. On a hot night one could not sleep because of the noise of their jaws grinding unceasingly.

The bits of straw fell to the ground: were promptly seized by crowds of Minor Workers waiting on the ground and hurried off to an unknown destination, possibly a hundred yards or so from the scene of action. There, in lieu of cultivated fields, were great chambers which would presently be filled with masses of desiccated food-stuff—reserve stores against the rainy day which *Hodotermes* so much dislikes. Thirty or forty pounds weight of chopped straw are sometimes found in these granaries.

The carriers waiting below seemed in sufficient strength to cope with all the provender falling around them, although, for some unexplained reason, they sometimes allowed it to accumulate in small heaps near the opening in the soil through which it would shortly disappear. By dawn of the next day they had made a clean sweep of all the fallen spoil, but, in the

meantime, the glare of an electric torch left them quite unperturbed: even the Soldiers ambling about the disintegrating bundles of straw were quite indifferent to it.

It is not the habit of *Hodotermes* to work by night on the wind-swept uplands of the Free State, and the alteration in their routine in the Tugela Valley is only another example of the Termites' adaptability to varying circumstances noticeable all over the world.

The storehouses constructed by them are more ornate and spacious than those of other species; they are supported by columns, not of soil left *in situ*, but of a material specially designed for masonry work. Thus *Hodotermes*' contribution to chemistry lies in the fact that these pillars are composed of an argillaceous compound, indissoluble either in alcohol or water; so far as is known, no attempt to analyse the substance has been made. There is no suggestion of an occult origin here, but a very definite chemical problem.

For the rest, *Hodotermes* is one of the most mobile of his race, with a decided preference for arable land; although Fuller first placed them in the Tugela Valley, to-day they are suspected of spreading all over the Union of South Africa.

CHAPTER XVI

INTER ALIA

"The socially higher forms of termites have been described as the most degenerate, but this is only in that sense in which man is also degenerate . . . in short, all the evidence goes to show that termites have been evolved from larger insects and reduction in bulk has been one of the main lines of specialisation."

—Claude Fuller.

THERE is a theory that in the dawn of the world all Termites were winged and perfect insects. Doubtless this was the case. But there is no evidence in support of the argument that they became apterous beings because they were driven underground by the surface ants, although it is a justifiable assumption.

Still, it is difficult to see how, being possessed of wings, they ever came into conflict with the ants. However that may be, it has become a legend that they took refuge in the earth because of the unwelcome attentions of the Formicidæ and other ground enemies. It is certainly true, to-day, that small, weakly colonies of Termites frequently fall victims to the roving and predatory ant, which attacks them in their homes. But the Formicidæ have no chance of overcoming active, strongly entrenched communities.

In order to test this conclusively, I have, not once, but many times, broken open with a pickaxe the outer

shell of a "monticule"—an expressive French definition of a mound, castle, citadel or ant-heap—and uncovered a gallery full of Workers. An alarm, in which four distinct notes could be detected, and which apparently signified the exact position of the breach, rang through the City. Major Soldiers appeared at both ends of the shattered gallery; within a few minutes hastily-summoned Workers started to repair the opening.

The Warriors, as is their custom, kept their posteriors well within it, but their mandibles protruded in the usual circle. Red and black surface ants were wandering aimlessly in the vicinity and I guided several of them to the breach. One or two must have hurried away for help, because reinforcements quickly arrived. At a measured distance of six inches, the Soldiers "sensed" the ants and moved out into the open to meet them, although they must have known that their softer nether parts were at the mercy of any rear attack. Despite the fact that soon they were sufficiently numerous to make an assault in force, the ants did not open the engagement; they inspected the defenders from a safe distance and . . . thought better of it.

Meanwhile, the labourers were working furiously to close the breaches. As these grew smaller, the Soldiers backed into them and vanished from sight; the last crevice was sealed, the final pair of mandibles withdrawn. It is not always so. I have seen martyr warriors remain in the open when the enemy was attacking *en masse*, who must have been aware that the Workers were closing their last avenue of escape,

shutting them out to certain death. They knew they were sacrificing themselves, but they made no attempt to regain the entrance, preferring to succumb at last, fighting desperately against superior numbers.

It is quite obvious that the Warriors, despite their total blindness, detect their approaching foes at a considerable distance, and this phenomenon has been explained by sceptics as being due to the Termites' sense of smell. But I have drenched a battlefield with an infusion of "khaki weed," which has a disgusting and penetrating stench, sufficiently powerful to overcome any other: and the Soldier's gift of recognising the presence of their antagonists was just as patent. Nor has it been definitely proved that Termites possess olfactory nerves.

A paper by Dr. B. Noyes (University of California), an authority on the anatomy of the Termite, contains the following statement which has some bearing on the subject of their nervous system:

"Sense organs end in nearly every hair on the antennæ, leg and mouth parts; and specialised groups of peculiar sense organs, *some of which are probably olfactory*, occur on the mouth parts and antennæ . . ." The italics are mine, and justified, perhaps, by the concluding portion of the quotation which appears to contain a touch of inconsistency:

"Termites are equipped to touch, smell, and taste, to sense the resistance of the wood they gnaw and *seemingly* become aware of the strain upon the wood itself."

Moreover, this somewhat non-committal statement was made of an inferior species, *Termopsis augusti-*

collis, and even if devoid of an element of doubt could not be accepted as an argument against the existence of some highly developed faculty of inter-communication, which is plainly visible between members of the most civilised families and the physical world, and . . . between each other.

This can be easily demonstrated by breaking into a runway, above ground, at a distance from the City and taking note of the interval of time between the moment of fracture and the sounding of the alarm in the City; it is a matter of a very few seconds. At the top of a Triucatli tree some thirty feet high I smashed the covered way leading to a lightning-struck branch from a castle fifty yards away. A companion posted on the ground heard the alarm sound within the City almost instantaneously. Neither the sense of touch, hearing nor smell could have carried that message so rapidly. There is only one conceivable explanation of how it is done. Apart from the sixth sense which enables the blind Termite to live as if he were endowed with sight, he must be blessed with methods of communicating with his fellows, far more complex than our own mechanised system of wireless telegraphy. Escherich is convinced of this.

It will be said, of course, that his tiny brain with its limited number of cells is incapable of such a feat. At least it must be admitted that this meagre equipment suffices to render him receptive to messages transmitted from the God who governs him. And, if he receives them from this Power, why not from his fellows?

My upland farm on the Kambula River, to the

north of Zululand and four thousand feet above sea-level, was under-run by Termites, chief amongst whom were *Natalensis*, *Hodotermes* and *Eutermes trinervius*. The last-named variety belongs to a family boasting a novel defensive and offensive apparatus which deserves special mention. At the moment, it will suffice to say that the Soldier caste of this genus flies a flag of identity impossible to mistake; his head is a bright pillar-box red. The Workers of this genus are indefatigable grass-cutters and their homes—a common feature of the South African veld—are like broad, low-domed beehives scattered over the landscape.

They are not wood-eaters in the sense which implies the wholesale destruction of Man's belongings, though the average farmer, uninstructed in Termite lore, makes no distinction between any of the families. In his eyes, all are tarred with the same brush and indiscriminately blamed for any injury inflicted upon the suffering landowner. It was with difficulty I persuaded my Boer neighbours that *Trinervius* was a comparatively harmless sojourner in their midst, and took no part in the assaults on the woodwork of their barns and buildings. Even then, he received no quarter at the farmers' hands. They said, anyway, that the Termites impeded their ploughing, and on general principles deserved no mercy. Wherefore their homes were ruthlessly shattered: their mounds used for paths and tennis-courts and their larvæ, in great combs, scattered to the domestic fowl.

Although *Natalensis* were plentiful on my farm they had abandoned their castle-building and retired

to the shelter of the soil: they were none the less aggressive. The homestead had been burnt in the Boer war, and whilst building another of stone, and perfectly insulated, I lived for a year in native-built rondavels. These are circular huts with walls of concrete brick or, as in my case, blocks of tough, fibrous vleisoyl, each weighing some fifty pounds: the roof was of thick reed thatch.

No sooner were the timbers of the latter dried out than Natalensis prepared for his inroad upon them in his usual way; the familiar, clay-covered ways crept up over the rough, outer walls towards the thatch. But the onslaught was too barefaced, too obvious to be ignored. They were brushed away as soon as they were seen; and for three years, until I sold the place, all their outward efforts met with no success.

But they were not discouraged; they bored through the hard, beaten floor of the rondavel close to the wall and made another essay. Again they were disconnected, not once, but many times. Most certainly they have succeeded by this time, for never do they relinquish any payable undertaking, whatever expenditure of patience and labour is involved.

No description of South African Termites would be complete without emphasising the intelligence of at least three other species whose method of demonstrating it is, so far as is known, unique. All are mushroom-growers and, of course, skilled gardeners. Not content, however, with the ordinary type of cultivation they have evolved from the depths of their inner consciousness a decided improvement upon the accepted methods.

One, *Odontotermes badius*, to whom reference has already been made, drives many vertical ventilated shafts direct from his gardens to the surface. He then procures and plants a special kind of fungus—*Armillaria eurhiza*, to be exact—and when it sprouts he leads the stipe, or stem, to the base of the nearest shaft—there may be ten or a hundred. The stipes then shoot up the narrow shaft, as slowly or as quickly as *O. badius* desires.

On reaching the surface at a season judged by the Worker to be best suited to his requirements, but generally in the spring, the growth expands into a large, pale and particularly fetid mushroom, so abominably scented that people have even written to *The Times* about them, wrongfully imputing their foul odour to the Termites themselves.

The stalks, however, are sweet enough, and it is these that the Workers bite off in tiny morsels and carry to those privileged to eat them, without disturbing the soil of the cultivated lands in any way. Thus, inch by inch, they nibble away at the stipes, which sometimes reach for three or four feet before gaining the surface. Lastly, the mushroom-head dies also, perfuming the outer air for weeks to come, for yards around. Fresh spawn is planted, attains maturity, is harvested, and so on *ad infinitum*.

Termes latericus and *T. vulgaris* join with *O. badius* in providing another conundrum for disbelievers in a God of the Termites. Although hearty haters even of star-light, they venture into the open, in parties, by night, to sow mushroom spawn around and about the surface of their respective homes. They

do it only after it has been decided that the fungus of the gardens is becoming exhausted or deteriorating in quality. (Among men, a committee of scientists or expert agronomists would be called upon to pronounce upon similar decadence.) Fragments are broken off, taken aloft and replanted in the open air, proving that the Workers are well aware that with fresh soil, plenty of oxygen and under new conditions the worn-out fungi will become revitalised. When this consummation is reached, the spawn is broken out, taken below and replanted, either in the original beds or in newly fertilised plots.

No comments are needed to stress the intrinsic value of this marvel. As for the means by which it is brought about, no cliché of "instinct" or "inherited reflexes" will explain them. We know by daily experience that any suggestion of advanced intelligence in any other animal but himself is repugnant to Man, if it does not mentally disorganise him. But can one imagine a blind Termite saying to another by the only method of communication doubtfully conceded to them—touch and smell—"We fear and loathe the outer world; light is abhorrent to us. Nathless, because our crops are failing, let us make up a party and start a terrestrial mushroom-growing concern for the resuscitation of our crops and for our future use and benefit. Go and find some other fellows to help us: arrange times and dates and see that the Soldiers are squared, lest they kill us"? I think not.

Yet, conquering their fear of death and disaster, they go forth. Rather, to my thinking, there came an order out of the void, and sent them.

The specialisation of some families leads one occasionally to premature conclusions, for one is prone to take it for granted that the higher are possessed of all the knowledge of the lower—an obvious fallacy. Then it comes as a shock to realise that some of the lower types work miracles of their own quite outside the province of the higher-born relatives. No other species—so far as I am aware—has carried crop rejuvenation into actual practice. Alternatively, *T. natalensis*, for instance, may have another method of intensive propagation or of renewing worn-out growths of which we are entirely ignorant. It must be so, or his crops would not go on for ever. His variety of mushroom which grows as soon as it is eaten is a case in point.

Incidentally, *O. badius*, who makes only small surface mounds to mark his presence—and will soon give up making any—has devoted his attention largely to the sugar lands of the Natal and Zululand coast. His services are not adequately recognised by the planters, but he plays an important part in the economy of the sugar-growing industry. Every morsel of trash left lying about, and stumps, after cane-cutting, are devoured, thankfully, by him, and their constituents returned, sooner or later, to the soil in the form of fertiliser. It is true that he has been detected in the act of laying siege to the young growth of the cane, but this is only another instance of his willingness to profit by Man's benevolence.

Odontotermes latericus does not fancy the coastal belt to any extent; he prefers higher ground. Yet this does not explain why he has altered the ordinary

method of ventilation, by adding a curious funnel to his home. Its purpose is a mystery: it might almost have been copied from the well of the ant-lion, but it certainly has nothing to do with insect-trapping or drainage: for *latericus* is not a carnivore, and he has no use for water in his home.

T. vulgaris is an adventurer among the Termes; he is found, strong and thriving, five thousand feet above sea-level, and his Alates have been seen flying at an altitude of six thousand feet. He builds no mounds or castles, though he is, of course, an agronomist. He excavates an enormous subterranean nest from which a number of passages rise up like the branches of a candelabra to within a few inches of the top of the soil.

I think, with a little encouragement, he might become a troublesome neighbour.

To conclude on an entomological note, there are about 100 genera and 1,200 species of the Termite family in Africa, and many unclassified. The nomenclature of many is still contradictory. As illustrative of the vast number inhabiting Natal alone, mention may be made of a discovery of a friend of mine, the late Dr. Claude Fuller, which has already achieved world-wide publicity.

In a piece of ground, measuring 84' by 84', within a town of Natal, he uncovered no less than fourteen settlements, inhabited by six species: *T. natalensis*, *O. latericus*, *O. vulgaris*, *M. incertus*, *E. trinervius*, and *E. bilobatus*. Based on these figures, one assumes ninety-three colonies to the acre—a sufficiently convincing proof of their prevalence and fecundity.

CHAPTER XVII

OLD WORLD TYPES

"They exhibit a highly developed antagonism to strangers from other colonies and hence the possibility of spreading contagious diseases, so important in population control elsewhere, is reduced to a negligible minimum among Termites."

—S. F. Light.

IF Barrell be correct when he estimates the age of the beginning of the Tertiary Period at 55/65 million years and the Termite arrived on earth in the Silurian, its ancestry would date back 200 million years. "During Oligocene and early Miocene," he says, "Man came down from the tree-tops," and, "early Man no doubt ate termites which had already developed a co-operative communism so complete that in comparison the most radical of our Bolsheviks are ultra-conservative capitalists." I am not competent to question his chronology, but, as will presently appear, with his estimate of the form of government employed by the Termites I profoundly disagree.

Specimens deriving from the Lower Oligocene can be seen in more than one museum, encased in amber and so exquisitely preserved that the spectator feels that if the transparent, fossilised gum were split open the insect would assuredly emerge alive. Strangely enough, specimens of the Termitidæ—most highly

civilised of all the families—have not been found in Baltic amber, though doubtless they existed elsewhere at the time. Von Rosen has shown that species belonging to the more lowly *Mesotermitidæ* and *Prototermitidæ* were abundant in pre-diluvian days.

In the Museum of Natural History of Brussels is a perfect winged *Alate*, admirably photographed by Hegh, which by some mischance, in the steamy, tropical heat of Middle Europe of those days, flew into the resin exuding from a pine-tree and was unable to extricate itself. Later, a minor upheaval or some other disturbance of Nature consigned both tree and resinous lump to an unknown depth below the soil surface. Countless æons passed; both became fossilised, and remained as one until separated by water or some other agency and swept into the Baltic Sea. Whence, after the passage of more centuries than the human understanding can conceive, the Termite in its amber tomb has been retrieved. Uninjured and lifelike in every detail, it confronts us from "the undeciphered caverns of the past," to confirm at least a portion of all that has been said or written of its hoary antiquity and to bear silent witness to the indestructibility of its race.

Judging by the high state of civilisation attained by the Termites of the Abyssinian highlands, it is reasonable to suppose that the Capsian and other neolithic communities of Northern Africa and Lower Egypt were acquainted with them, if only in their more primitive form. Probably the Badarian farmers of Upper Egypt and the Fayum found them as

troublesome in their fields as they are elsewhere to-day.

Possibly because of that and his unobtrusiveness no record has been kept of his existence. He lacked the impudent self-assertion by which the scarab beetle impressed the priesthood and thus escaped the immortality awarded to that enterprising insect. But the ancient Egyptians certainly knew and feared the Termite, and the assumption that we owe to their abhorrence of him all the disinterred treasures of Egypt, all our knowledge of the tombs of the Pharaohs and their contents, is more than a vague hypothesis; it is a moral certainty. I suggest, even, that there are adequate grounds for believing that the Pyramids themselves were so constructed, that they and their contents should be proof against Termite attack. For those who ordered into being what they regarded as inviolable sanctuaries must have realised that by no other means could they protect their sacred dead.

I am indebted to M. Quibell, sometime Director of the Museum of Antiquities, Cairo, for the following incontrovertible if somewhat fragmentary evidence that the Egyptians of those days both knew and feared the Termite. The words are his, the translation mine:

"They [Termites] had operated on rectangular sarcophagi dating from the beginning of the Middle Empire which I found near the Pyramid of Teta. Here, as in other cemeteries, the body is enclosed in a double coffin. The exterior coffin is of sycamore wood, the interior of pine wood, possessing an essence

the origin of which has not been determined. But the exterior coffin was often gnawed by Termites, whereas the interior was always intact. . . . The Egyptians were perfectly well aware of the strange qualities of the essence and its use in the preservation of the corpses against the insects' attacks. . . . Owing, perhaps, to its scarcity, the pine wood was used as a veneer . . . the minute insects were well traced by the galleries of approach on the pine wood, but not having found it edible they had not damaged it."

M. Quibell reports, further, that he found, in a part of the Sakkara tombs, superimposed sarcophagi of five different periods. Termites had destroyed sarcophagi dating from the Middle Empire, but they had not attacked those of more recent periods which were placed on top of the most ancient.

He recalled another remarkable incident occurring in 1896 in the Ramesseum. He had reached a tomb intact since the XXII dynasty. He broke down the wall of bricks forming the entrance and looked inside. "From the ceiling hung a branchy construction, the bifurcations of which reached down to the sarcophagus within: it was composed of Termite tunnels. The sarcophagus was apparently intact; in reality it was held together by a very thin coat of paint and the rest of the Termites' galleries.

"It was very hot and humid in the tomb, and no sooner had the cold outside air penetrated the interior than the walls of the sarcophagus began to crumble."

It is curious that no reference to the Termite has been found among hieroglyphic or other inscriptions

on papyrus, manuscripts, shards or tombs, though it may well be that the Nile basin was so thickly populated in the days of the early cultures that the Termites' footing was a precarious one, and that they had been forced back to the desert.

Three facts relevant to my own conception of the Termites' intelligence emerge from M. Quibell's experiences—namely, that they were as competent in aerial construction, then, as they are to-day; they were as capable of detecting nutriment behind solid walls and of penetrating bricks and mortar to get at it; and by the sense of taste or smell or some other faculty they were inhibited from attacking material impregnated by some unknown process, with a repellent substance or fluid.

It is strange that in this world of "progress," with all the resources of science at our command, some millions of pounds are spent yearly in more or less futile preventive measures against their attacks. Yet, three or four thousand years ago, the wise men of the Delta knew of an "undetermined essence" which, employed on a timber so susceptible as white pine, rendered it immune. Either our methods of research are at fault or the old Egyptians knew more than we do; both hypotheses being, of course, unthinkable.

During a later civilisation, Pliny, in his *Natural History of the World*, made reference to some legendary "ants," of which he records that "they were in colour like cats and as big as the wolves of Egypt." Herodotus (IV, 13, 27, and III, 116), not to be outdone, mentions gold-mines worked by harmless ants "as large as foxes."

Allowing, then as now, for traveller's licence and for a suspicion of exaggeration in the size of these apocryphal "ants," it is possible that both authorities confused these ants with Termites, much as people do to-day. If that be so, it is plain that the Termites had already attracted attention in days when Natural History was largely a matter of hearsay. Anyhow, I can well imagine surface-gold being scooped out of Termites' "nests" raided by "ant-bears."

In the days of Herodotus there were no lengths to which the uninstructed were not prepared to go in their acceptance of the prodigies of the animal kingdom, yet may we bear with their superstitions. Tales no less fantastic are told every day. As I write there are people in West Cornwall who believe that ants are the simulacra of the ancient Druids, driven underground and growing smaller with the years. Nearer at home, we know that so long as charlatans can convince men and women that the stars are concerned in the destiny of insects such as themselves there can be no limit to human credulity.

Later still, we come to casual references of early travellers of our own times—hardy pioneers who went and saw and passed on unwitting of the marvels beneath their feet, or, what was more probable, thinking them, literally, beneath their notice.

Such a one was Jobson who, in *Purchas's Pilgrims*, Vol. XI, records in the "History of Gambia"—"The Ant-hills are remarkable, cast up in these parts by Pismires, some of them twenty feet in height, of compasse to contain a dozen men, with the heat of the sun baked into that hardnesse that we used to hide

ourselves in the ragged toppes when we took up stands to shoot at deere or wild beasts."

In 1780, a very low type—*Calotermes flavicollis*, a wood-dweller, and one still in considerable disrepute elsewhere—invaded France. He may have been carried there in ships or arrived by driftwood, but, he remains there, albeit in negligible numbers, to-day. He did enormous damage in Rochefort, La Rochelle and Sainte in the Lower Charente, to buildings and property of all sorts.

Entomologically speaking, it seems that Moufet (1634) and Charleton (1677) adopted the word "Termite" in the sense of its application to insects in wood. According to Linnæus, they were apterous: his *T. fatale*, however, was a hypothetical species, and although recognised, apparently, by some investigators, the questionable nomenclature is not generally accepted.

A line drawn on Mercator's projection of the world from Northern California, bearing south through the United States to the south of France, Germany and Russia, dipping sharply as it traverses Siberia and passing through Northern Japan, defines fairly accurately the northern limit of the kingdom of the Termite. The latitude of mid-Patagonia represents its southern boundary.

Throughout the vast area comprised within these two lines of demarcation, the following essential facts must be realised as indicating the varying degrees of civilisation of the insect, though how or why attained in the specified localities are matters of pure conjecture.

- (a) The most important, highly specialised and definitely civilised families are found in
• Africa.
- (b) They are less specialised in India, Assam and Malaya.
- (c) In South America they are more primitive than in either (a) or (b) categories.
- (d) In North America, Japan, China and South Australia are the most primitive of all.

Among the lower types, however, are found many instances of special development; thus, a very inferior species often exhibits a peculiarity of its own and a startling method of demonstrating it. Such a one is *Microcerotermes parvus* of Zululand, a not very eminent genus, but sufficiently intelligent to forestall in an inverse way Man's invention of moving stair-cases.

His workers construct inclined planes down which the queen rolls—or is pushed—when her cell becomes unpleasantly crowded with eggs. Unlike the *Termes* queen, she has the gift of modified mobility, if only to the extent of waddling to the brink of the incline and sliding down it; her eggs remain until hatched always where she laid them, and another cell awaits her at the bottom of the chute.

The huge impressive castles, towers, monticules and strongholds of the Termite are most common in countries and districts sparsely populated by man; it may be taken for granted that where exceptionally stout and lofty dwellings are found, a strong and virile race is responsible. They are not to be seen in

India, Malaya, China, or Indo-China, though these lands are in every way suitable for their development: Man has crowded them into seclusion: in Central Africa, Abyssinia and Northern Australia they abound. There is no element of speculation in the theory that once upon a time all types, with the exception of the arboreal, dry-wood and damp-wood dwellers, built monticules, and that the rightly feared proximity of Man has driven them underground. As Hegh puts it: "In the regions more inhabited certain species which usually constructed great monticules have adopted subterranean habits."

I have observed this dislike to Man in my own lifetime. Wherever he has bestowed the questionable boon of his presence, even in lands where his homesteads are not less than five or ten miles apart, the order has gone forth, and no more castles which would attract his unwelcome attention are being built; even the low mounds of the grass-cutters and foragers are becoming less conspicuous.

On my own upland farm in the north of Zululand, where, in some paddocks, there were forty mounds to the acre, it was reported to me, by natives, that no new ones had been built since first the farm had been occupied, fifty years before. I have yet to meet anyone acquainted with the elementary facts of the Termite's life who is prepared to accept this as pure coincidence.

So far as Old World architecture is concerned, any example of a typical tower over thirty feet in height, in the Congo country, affords a striking illustration of the inspired ability which would be

needed, comparatively speaking, were Man called upon to do likewise. Assuming the size of the unclassified Worker that built it to be one-quarter inch, it has been estimated that to accomplish a similar feat, blind human beings, working without tools, would have to erect from the inside a weather- and wind-proof tower a mile and a half high, or more than ten times the height of the great Pyramid.

In no part of the world can members of the most advanced families be justifiably regarded as pacifists. But they fight only for self-preservation and the abstract principle of freedom. They only take the initiative when either is threatened. Thus, in this respect, no analogy can rightly be drawn between them and Man. They mind their own business and take no part in other people's disputes; in no circumstances will Termites gratuitously open hostilities. But if his interests be threatened, his privacy invaded or an unprovoked assault made upon him he will cheerfully prefer death to dishonour, or to avoid ambiguity—cowardice. Which is the reason why separate communities living cheek by jowl, as it were, strictly observe each other's boundaries, in perfect amity, but careful of the "No trespassers" understanding recognised by all. Should one encroach upon another's territory, as sometimes happens in their underground explorations, war is instantly joined. Both Soldiers and Workers take part in it. Termites of different genera, under control, "sense" a stranger, clinch, and one or the other dies.

This avoidance of strangers, however inculcated, is doubtless largely responsible for the Termites'

immunity to epidemics and microbe-carried disease. Indeed, he appears to be the only form of life in Nature which is not subject to contagious disorders. Let us compare him with the leper as seen by Sir Patrick Manson, and say which of the two have travelled farthest along the road to an ideal civilisation.

"The fingers and toes ulcerate and drop off or they become distorted and atrophied: or the phalanges are absorbed, the hands and feet becoming reduced to useless stumps. A peculiar goat-like smell is emitted by the ulcerating, decaying body. Altogether, the blind, lame, unhappy wretch—still retaining his intellect, but devoid of every sense except that of hearing, breathing with difficulty through a stenosed larynx and racked by neuralgic pains and irregular outbursts of fever—comes to present, before the inevitable death from exhaustion occurs, a sadder, more loathsome and more repulsive picture than anything imagination could conceive."

Until very recently it was held by many authorities that the caste of the newly born Termites was not predetermined; they said that it was resolved by the Workers, subsequent to the hatching of the young, whether by hundreds or thousands; and that it was accomplished by a special form of food supplied by them. But no evidence was adduced in support of this theory; nor, whilst tacitly investing the insects with this amazing selective power, did they venture on any surmise as to the particular form this food would take.

Others broke even more controversial ground by suggesting that male Workers were automatically castrated by the pressure of infusoria carried in their

hinder intestine. Both theories have been, in effect, exploded. It has been found that caste differences are definitely inherited and that the nymphs divide into two series, one, the perfect insect with normal brains, eyes, and reproductive organs destined to develop into fertile insects; the second, with smaller brains, eyes and organs who became Soldiers and Workers. The last, whose reproductive organs are atrophied, may be of either sex, and, in the case of female Workers, it sometimes happens that by some cognate law the inhibition is removed and they recover the sexual potency denied to their caste for untold generations.

Holmgren, in his summary of the evolution of the Termites of the world, puts forward a theory which, to my mind, is open to further criticism. He says: "As the Termite advances from the lowest (*Prototermitidæ*) to the highest (*Metatermitidæ*) there is a distinct physical or morphological deterioration in the species and a concomitant improvement in the nervous system."

He attributes this to advancing social organisation. But whilst conceding the latter it is difficult to see how, in view of the physical and mental superiority of *T. goliath* and *T. bellicosus*, such a contention can reasonably be sustained.

CHAPTER XVIII

EUTERMES

"The classification of Termites has long bristled with many nomenclatorial puzzles and, as the years go by, these are either added to, or many, already complex, are made more intricate. Among modern taxonomists there is no common agreement, but ample evidence of tacit disagreement.

"Then, too, dogmatic assertions are frequent and quite unsupported by evidence or argument.

"The one common policy seems to be the avoidance of a complicated position by ignoring it."

—Claude Fuller.

Journal Nat. Hist., S.A. Vol. IV.

THEY are called, indifferently, Eutermes, Nasutermes, Nasutitermes, Syringe Carriers, Fontanel Owners or Proboscidean, and some authorities refer to the Soldiers alone as Nasuti. Indeed, there appears to be more than a little diversity of opinion among the pundits concerning their Order, genera and species. Banks substituted Nasutitermes for Eutermes, with generic rank, but certain works of reference by different authors do not agree with such classification, nor does it appear to be generally recognised.

Physiological distinctions have no doubt led to their being assigned a place among the first families,

but they are a long way behind the *Termes* in an agricultural sense and in their culture.

Dr. Bugnion would seem to place them second in the scale of Termite evolution. Hegh, on the contrary, amongst others, accords them close relationship to the *Termes* of the same family. To a layman, writing with all due deference to accepted authority, and with diffidence, it is fairly obvious that *Eutermes*, with one exception, is appreciably inferior in scientific attainment, in the domestic virtues, in the manners and general behaviour tending towards the perfection of the aristocracy of the Termites. He excels only in chemical warfare.

However, this is no place to start a controversial hare, followed by a pack of conflicting data and opinions; it only remains to be said that our knowledge of the home life of *Eutermes* is elementary, the bulk of human research having been chiefly confined to study of what I call his more advanced relations. It is more by way of contrast and for the purpose of picturing a totally different variety of termite life that *Eutermes* is brought under notice.

Primarily, a contradistinction of importance lies in the well-known fact that whilst *Termes* use salivary cement for their building and masonry work, the binding material of *Eutermes* is entirely faecal. Another major difference between them lies in their method of defence, or offence. The Soldiers of *Nasutitermes* have followed a line of development until their frontal structure bears no resemblance to that of the other families.

Their mandibles have dwindled—in some species

they are almost vestigial—and, in their place, they have evolved an extended proboscis, syringe, cervical ampulla or fontanel, varying in size but capable of discharging either a paralysing, poisonous, semi-paralysing, or sticky and comparatively innocuous fluid. Close at hand the heads of Nasuti warriors look exactly like the pointed helmets worn by knights of the time of Richard the Lion-hearted.

That they are blind does not appear to affect their aim when firing the liquid they secrete from their hypodermal glands. I have seen, in Ceylon, *E. monoceros* project an almost invisible jet to a distance of an inch; the secretion he fires is non-toxic, but it tangles up the feet of his enemy and puts him out of action more effectually than any fly-paper; his range is an unknown quantity, but there is no doubt of the accuracy of his line of indirect fire.

This species is not as advanced as his African prototype, *E. trinervius*, who acquired a good deal of publicity by being closely investigated by Dr. Bugnion, whereas few people in Africa are interested in the local *Eutermes*; he does not devour peoples' houses or furniture and is therefore negligible except in an academic sense.

E. trinervius differs from all other genera of *Eutermes* in that—if rumour may be trusted—he is anxious to acquire some of the culture of the superior *Termes*. One learns, on very good authority, that under the low, circular mounds he constructs on the veld, attempts at laying out gardens on a small scale have been definitely observed. Certainly, I have seen mushrooms springing around the sites of his

homes, indicating that he had essayed the industry but that his fungi had got out of hand. But the processes of the Termite are such that what may be contradicted to-day are, to-morrow, proven facts.

As much as twenty pounds of chopped hay and dried grass have been removed from one of his nests, always surmounted by the mound which looks like a Kaffir kraal in miniature. His Worker's method of harvesting is a peculiar one and can be clearly seen on a still, warm night, after a stealthy approach and by the aid of a powerful lamp. He climbs a grass-stem almost to the top, reverses himself, clasps it firmly and hanging head-downwards cuts or saws around a measured length. As it falls he clutches the stem lower down: measures off a second length and repeats the sawing process. Notwithstanding his blindness and lack of a foot-rule, his measurements are meticulously correct.

Whilst he is thus employed, a few Soldiers wander about the grass-roots; if it be desired to see them in any number a few knocks on their inverted bowl of a mound will bring them out in force, each with his syringe at "the ready," and each, according to Fuller, "with a fine thread of clear, viscid fluid hanging from it or floating in the air."

Froggatt, speaking of *E. trodix*, an Australian variety, makes a similar comparison: "Soldiers project a jet of clear, honey-like fluid which has the appearance of a silk thread waving from tip of snout."

Adverting to *E. monoceros*, the Black Termite of Ceylon, and Dr. Bugnion's description of his most

interesting activities, in 1926 I spent some time in the island—the last of many visits—intent upon corroborating some of his observations. Thus, at Horogolla, near Colombo, I had many opportunities of watching the marches of *E. monoceros*, when they set forth in organised armies in search of the edible moss of which they are so fond. The use of the word “search” is questionable, for they must have known beforehand where to find those coconut palms, which, out of many thousands, were in possession of moss.

It was up one of these palms that they were to be found streaming, in an army of many thousands, in column-of-route formation with Soldiers in open order on either side. Their discipline appeared to be perfect and it was noticeable, on every occasion, that the escorting warriors walked with their syringes pointing slightly outwards at a distinct and uniform angle to the line of march. Their outward journey took place at evening; they returned early in the morning in the same order, but in lieu of being empty-handed, on the homeward journey each Worker was burdened with a morsel of lichen. It is supposed that this lichen is gathered for the benefit of the young and the Queen of the community, but the data available of the interior economy of this species of Termite are extremely vague and call for further and far more detailed investigation.

As a minor experiment, I collected a few score Soldiers without much resistance on their part, with a dozen or two Workers and took them to the Galle Face. There, next day, I placed them in an open

cardboard box, from which they made no effort to escape; indeed, they seemed merely bored. When a number of small red ants, collected from the gardens, were introduced, the Workers hustled together and the Warriors, without touching them or each other, immediately formed a ring around them, their probosces pointing outwards at the foe. Indeed, their attitude of collective defiance made me wonder if we once acquired our knowledge of hollow squares of infantry by intuition, experience, or inherited reflexes, or if the instinct of the Siphonophora as applied to ourselves, and not to the ant family, was responsible.

Fortunately for themselves, in this instance, the ants proved to be pacifists and although one or two made half-hearted passes at the Eutermes, none ventured close enough to become entangled in the threads of fluid shot at them by the Nasutis. But the gun-laying of the latter was unexceptionable.

There is an extraordinary diversity in the conditions under which Eutermes live and have their being, whether in subterranean galleries, arboreal nests, which include "cartons," "nigger-head" balls, or in inverted black bowls above ground. In the Congo country they build nests like beer-casks, seventy or eighty feet from the ground, of chips of wood glued together. The usual covered way leads from these down to and under the soil. No one knows the laws which govern these semi-arboreal dwellers or the reason of their double life, or whether that section of the community which roosts in the tree-branches does so as a privilege or a penalty.

What we do know is that another species, *E. contractus*, is sometimes found encroaching upon the suburbs of cities belonging to and occupied by *Termes* cultivators; that he does so furtively and cringingly, with the deliberate intention of stealing the prepared soil belonging to his hosts, for carton-building purposes. Yet I have heard it said that the Termites have nothing in common with humanity.

The same unprincipled behaviour has been observed by Escherich in India, where he found another branch of the *Eutermes* family ingratiating themselves with the *Odontotermes*, seeking house-room, which was not denied them, and thieving at the same time.

With every analogy drawn between Man and the Termite there is, or should be, perhaps, a divergent contrariant. Wherefore, it may be recorded of the best bred among the latter, the *Termes*, who are culturally the most civilised of the race, with the highest standard of living, and, it is surmised, the longest ancestry, that they are neither thieves, sycophants nor parasites. Alternatively, in the ranks of the slum-bred and primitives are found all three.

There are many astounding types of architecture in the Congo country for which *Eutermes* are responsible, the most common being great black sponges honeycombed with thousands of cells; another variety, which constructs chevron-like shelves down the long length of a tree-trunk, is supposed to belong to this family. There are eighteen species known in the Belgian Congo and probably double that number of unidentified; even the quota of castes

appertaining to each is imperfectly understood, and, within reasonable limitations, the same may be said of the Seychelles, Madagascar and Abyssinia.

It may be said that all over the world *Eutermes* exhibits two distinct biological types—the concentrated and diffused; a characteristic mode of living distinguishes both. In Africa they excel in producing bizarre forms of architecture of which modifications exist in other parts of the world—divers examples of pagodas, pillars, steeples, tall hats, umbrellas, soup-plates, barrels, kegs and oblate spheroids are some of them. *Eutermes fungifaber* probably reaches the acme of fantastic design in Central Africa, when he puts together the most delicately fashioned, fringed and capped structures with scalloped drooping edges like a lady's sunshade.

The syringe of the *Eutermes* Soldier is common to all types; indeed, they seem to have sacrificed their mandibles for the benefit of this weapon; it is possible that the other genera in years to come will eventually abandon them in favour of the more easily brandished and more effective projector.

But *Eutermes* does not use his syringe as ostentatiously as he might, though an invasion of surface ants will always cause an instant demonstration of it. In rare cases of internecine warfare it is seldom employed. Two individual Soldiers of the same species but of different colonies, if brought together, refrain as often as not, from using their artillery. They content themselves with bumping each other violently and even engage in bouts of playful wrestling. When ranged in numbers against

the same opponents, disdaining to shoot, they frequently charge and ram each other in a most disconcerting manner, rather like all-in wrestlers.

The toxic qualities of *Eutermes*' secretions differ in various species; as to its origin, one might as well speculate on the poison fang in the hind leg of a platypus; it is just there. But in spite of it and its unpleasant properties, I think *ornithorhyncus* is wanting in the grim, valiant, unconquerable spirit which distinguishes the *Eutermes*, who, incidentally, are not the only members of the race who boast an offensive proboscis. The Soldier of *Coptotermes ceylonicus* is an example of a few other species similarly equipped. He, when disturbed, squirts a drop of sticky, white liquid from his frontal pore; his head contains a whole reservoir of this, hence his sobriquet of the "Latex Termite."

Similarly, if one annoys the soldier caste of *O. badius* or *O. vulgaris*, when lifting them by hand, it is not unlikely that they will retaliate by emitting a drop of corrosive fluid, which, if not promptly removed, will set up an unpleasant irritation persisting for some days. *O. latericus* has the same caustic habit, but his secretion is coloured red; if left alone, it will produce ulcers on the contacted flesh.

On the whole, evidence points to a day when for their own protection all the higher genera will be endowed with this supplementary weapon; for many other species have holes in their heads where probosces might be and are not, whilst others again, notably *Mastotermes*, *Microtermes* and *Calotermes*, show no sign of a fontanel.

It has been indicated that, as a designer, the African *Eutermes* has more Epstein in his composition than any of his brethren. But his contorted eccentricities are on a small scale compared to the truly impressive architectural efforts of his brother, *E. pyriformis* of Queensland. There are no geometrical similes by which they can be described—an illustration must suffice. More *outré* and far more irregularly fashioned than anything in Somaliland, where alone are competitors found, they stand among the eucalypti like so many ruined castles—a comparison so utterly incongruous in an Australian landscape that an actual view is necessary before it can be aptly appreciated.

Even a more ambitious species—though he fails of his object—is *E. fumipennis*, also of Queensland, who builds amorphous masses, a ton or so in weight, in the branches of trees, living or dead. He makes these of a woody substance mixed with soil: and every nest has galleries connecting his arboreal with a subterranean lair. I have seen many tunnels of grey-black earth running twenty, fifty or over a hundred feet up the barkless skeletons of ring-barked eucalypti to nests wedged in the forked branches so high that they looked no bigger than footballs. They present very much the same sort of problem as *T. natalensis* in the Triucalli forests of Zululand; except that the latter's object in climbing was to devour dead wood, whereas *E. fumipennis* does not eat wood at all.

So we are left guessing as to how, in the first place, he acquired knowledge of those lofty perches: who

issued orders that they were to be utilised and, lastly, to what end? No animal as intelligent as the Termite would undertake the enterprise of scaling that dizzy height without some definite and well-considered plan in view. Another curious fact connected with the arboreal nests of this species is that the diameter of the area of his underground home is, approximately, the same as the height of the site on which he builds his airy, suburban residence.

How distinctions are drawn between those members of the community who live on the trees in a nest which obviously cannot house more than a fraction of their number, and those underground; or whether they take it in turns to go aloft, when in need of a change of air, are unsolved mysteries.

The inquisitive traveller who breaks into one of those covered ways in the early morning or towards evening, will always find them occupied by hurrying Workers carrying burdens upwards—in the heat of the day they seem to rest; further, any attempt to separate the tree-dwellers from their subterranean friends will invariably fail, even if the investigator demolishes yards of the galleries leading aloft. News of the disaster is telegraphed to the City: all leave is cancelled and repairs begin at once, to be continued, without resting, until contact is re-established.

In treeless country, it is by no means unusual to find nests built into crevices in sandstone or outcrops of other rock. But whether on stone or in trees, the scheme of construction varies very little. The outside covering consists of a compost of rough, ligneous

matter enveloping two or three correctly-spaced, concentric layers of differently treated and much finer material: the Royal Cell is always in the centre of the nest. In the nigger-head cartons, the measurements of the respective layers are more or less uniform: in the bulkier specimens the thicknesses are not so well preserved. In any case, the interior is such a maze of interconnecting passages and cells that the system on which they construct the whole is past all human understanding. As is also the phenomenon that in many of them parasitic rove-beetles are found living in the cells of, and in perfect friendship with, the Alates of the community.

But if the Eutermes family throughout Australia are comparatively harmless, living, as they do, on mould, grass, leaves and such-like, the same cannot be said of their relatives in many tropic islands where they appear to have carried out evolutionary—and revolutionary—ideas of their own. *Nasutitermes* of various species in the Philippines have developed castes of black-, yellow- and brown-headed Soldiers, whose Workers not only eat wood but everything else which lies in their way: they also have a preference for the carton life and are found, similarly domiciled, in the West Indies, particularly in Trinidad and the Bahamas.

If it be not sheer coincidence, there is, in the life-history of Eutermes, or *Nasutitermes*, an exceptionable example of complete indifference to the attitude of Man towards themselves. We know that the most destructive families of the race are at pains to conceal their existence from Man, and, at some risk to

themselves, their depredations upon his property; they will even go to the length of altering their form of life altogether. But *Eutermes*, with one or two exceptions, is unconscious of any wrong-doing, from Man's point of view, and will flaunt his nigger-heads, cartons and shapeless aerial mounds on the most conspicuous trees for all the world to see. And go on doing it.

CHAPTER XIX

TERMITES OF THE ANTIPODES

"According to the Stoics . . . the souls of man and animals were alike parts of the all-pervading Divine Spirit that animates the world."

—Lecky.

Rationalism in Europe.

AUSTRALIA is pre-eminent in the termitological creation for one sufficing reason: the continent boasts a family with a single representative, *Mastotermes darwiniensis*, which is not found anywhere else in the world. It was not always so. Von Rosen discovered fossil specimens of no less than four extinct species of the genus in the Eocene and Upper Oligocene of England and one in the Miocene of Croatia; which is fairly conclusive evidence that it was once widely distributed over a far greater area. Then Nature, with her usual lack of consideration for the weak, decreed a glacial period, and that was the end of *Mastotermidæ* in Europe. They went the way of all the animals, both great and small, which once prevailed in the Old World; but why the sole survivor of this family should have been relegated to Australia is not so clear.

This solitary, archaic species differs structurally from all others of its race; Holmgren connects it with the *Protoblattidæ*, extinct in the Permian, as

deriving from a common ancestor; very much in the same way as relationship is traced between the chimpanzee and ourselves.

To carry the analogy still farther, it may be accepted as an article of faith that this primitive insect occupies, in its own cosmos, exactly the same position as the aborigine of Australia does in ours, that is, the lowest in the scale of humanity.

M. darwiniensis does not build vast termitaries, or impressive castles or even modified mounds; he spends his furtive life in the trunks, branches and roots of trees; except for his entomological interest he would be quite negligible. We can dismiss him, thus, for Australia is rich in other forms of Termite life and offers a wide field of investigation in the lives of many and more varied types.

Distinguished naturalists like Froggatt, Silvestri, Hill, Mjoberg and many others have accomplished much in the way of research among them, but more remains to learn. All have added to our knowledge of the various families distributed over the continent, and this, in the face of difficulties consequent upon unsystematised classification: most of them have added new discoveries to the already extensive list of identified species.

Thus, Froggatt accounts for six sub-families, nine genera and thirty-eight species, twenty-eight of which were determined by him. Silvestri added to this list nine other species and one new genus, *Monodontermes*. Mjoberg, however, collected fifty-one species in Queensland, New South Wales and South-west Australia alone.

Metatermitidæ, the first family to which *T. natalensis* belongs, is well represented in Australia. But none of the genera established there have attained the same degree of civilisation manifested in the daily life of the former. For example, their buildings, in the matter of design, fall far short of those of Central Africa; monuments of industry though they be, there is a heaviness in their construction, an excess of bulk as it were, which is more impressive than graceful. So far as I know, there are no mushroom cultivators in the Antipodes.

Hamitermes meridionalis, however, has provided naturalists with a unique and inexplicable mystery; he orientates his bluff, forbidding, oblong castles, and leaves it to us to explain why he does so. The finest specimens are to be seen, perhaps, in the Cooktown district of Northern Queensland, where their upright towers of black or dark ash-coloured clay, topped by jagged lines of slender pinnacles, are a familiar sight. They look, at a distance, like grey tombstones with serrated or saw-like summits.

These are always built with the narrow ends pointing due north and south; the eastern face is usually convex, the western concave, not always in a very marked degree. This consistent orientation—which rarely varies—has given rise to a good deal of controversy, with the inevitable result that, in regard to it, nothing has been proven. Some authorities declare that these citadels are constructed on the line of least resistance because the strongest prevailing winds blow from the north; others contend that the western exposure allows for a broader surface facing

the afternoon sun, and that as *H. meridionalis* cannot extend his buildings in wet weather, the wider expanse results in quickly-drying surfaces and affords him better opportunities for adding to his citadels—a task which occupies a good deal of his time. The result of all this speculation is exactly . . . nil.

It is to me an extraordinary state of affairs that these investigators or theorists should be at such pains to decide the why or wherefore of this Compass Termite's uncanny wisdom, in demonstrating his knowledge of a true north compass-bearing, when the whole of the Termite world bristles with problems far beyond the comprehension of Man.

Singular as he is, in the possession of this gift of orientation, whatever its purpose—and it is undeniable that his squarely cut towers make for cooler conditions within than those which obtain in the conical types—*H. meridionalis* is notorious as an inheritor of a far less pleasing attribute. Under the roof of his crenellated castles he builds and maintains long, wide cemeteries filled with his dead, but occupied by no living Termite. Below that, again, are store-houses full of desiccated matter, supposed to be the pulverised bodies of the dead. Mjoberg, who inspected many, hesitates to pronounce them reserve stores of food for the Alates, though he suspects as much. Further, he ascribes the overflowing condition of many of the cemeteries to a high death-rate, as well as proof of measures taken in regard to the sanitation of the City.

The expense and labour involved in carrying out a comprehensive study of this interesting type are

beyond the means of most students; personally, my experience among them was restricted to looking at them from the outside.

But it is evident that these Australian Termites have neither learnt nor been instructed how to preserve the balance of castes, without resorting to such brutal methods; the fact places them in a very inferior status compared to that of their African kin, who exhibit perfect familiarity with the ethics of birth-control.

During the season when hot winds are prevalent in these latitudes there is no humidity in the air and the temperature rises to oven-heat. One would not imagine that any ultra-torrid conditions would discommode the Termite; nevertheless, these and other varieties make a practice of deserting the middle and upper parts of their castles, and retiring, during the greater heat of the day, to the comparative coolth of the subterranean City.

Whilst on the subject of the unpleasant types confined to Australia, it is impossible to avoid mention of the most barbarous—*Hamitermes perplexus*. They, too, have their charnel-houses on the top floor of their citadels. But to them they convey the living instead of the dead, and keep them there by ordering certain Soldiers to bite off their feet so that they may not escape. Most of the victims are Alates, with elementary wings, but a sad minority of Workers and Soldiers is always found among them—probably the aged, the maimed, or the heat-stricken.

If one regards dispassionately this ultra-Bolshevistic scheme of compulsory liquidation, it is

impossible to abstain from asking—who decides when and why an unwanted majority should thus be sentenced to death; who selects the victims, in proportion to their respective castes and who cries, "Halt! Enough"? There seems little doubt that although the surviving Workers, who were neither called nor chosen for the holocaust, have not been seen in the act of devouring the captives, they eventually do so when the latter have died of starvation. In any case, it is certain that the Ruling Spirit of the City does not inculcate in his subjects the consideration and love for the nymphs which is so striking a characteristic of the African aristocracy. Rather one might propound a theory that these Australian cannibals, judged by human standards, are governed by a devil instead of a god.

That would be a just conclusion at which to arrive if it were not for the fact that at no great distance from their homes, our "black brothers"—a missionary concept, not my own—of the Solomons and other South Sea Islands have been cheerfully eating each other—and strangers—for unnumbered years, and to this day some of them see nothing reprehensible in the custom. Other exceptional instances spring to the mind.

Drepanotermes Silvestri, who lives in neighbourly contact with the cannibal aforesaid, in flat-topped, massive and more or less circular castles, has some peculiarities of his own, also. For one thing, his dietary is not altogether above suspicion and the morality of some of his castes is open to criticism. His queen does not lay eggs all the year round but,

owing, it may be hazarded, to climatic conditions, enjoys a breathing space at intervals, when reserves take over her duties. The king, who has his counterpart in many of our own civilisations, from Solomon downwards, is rarely seen in company with his lawful wife and has never been found in the Royal Cell. Instead, he lives with the allegedly virginal, fully grown or partially developed nymphs and in their own quarters. He is the non-celibate Don Juan of the Termite world, browsing in strange pastures, the lord of a veritable *parc aux cerfs*. Neotinic queens are so much in evidence in his kingdom that there can be no doubt about his loose life and lamentable morals.

None of the genera of *Hamitermes* follow a practice observable in many communities; they do not eject from their cities pellets of faecal matter; they prefer to store them in large, specially reserved chambers, in which they are accumulated until the store-rooms are full from floor to ceiling. It has been accepted as an article of faith that this substance is used as diet, but the premises are purely presumptive. In all those I have investigated there have been no signs of it. On the other hand, so far as has been ascertained, no Australian Termite cultivates fungus methodically; but unless it grows spontaneously among their galleries and corridors, it is difficult to define the form of nourishment supplied to the young Alates.

Termites, throughout Australasia, who build large castles or mounds are, with very few exceptions, entirely graminivorous. As elsewhere, it is those who

dwelling, furtively, in underground nests who are responsible for all the damage done to the works of Man. Therefore, one can admire without any *arrière-pensée* the wonderful examples to be found in Queensland and the Gulf of Carpentaria country.

"All these huge castle-builders," says Saville Kent, "are exclusively graminivorous, collecting and hoarding up, in their innumerable provision chambers, vast stores of cut-up grass-fibre."

On the Cape York peninsula is a promontory shown on the Admiralty charts as "Ant-hill Point." It looks, from the sea, like a wide expanse of savannah sloping to the seashore, literally covered with pyramids from four to fourteen feet high. Tourists in passing vessels, when informed by the ship's wag that they are now passing a native graveyard, invariably believe a statement which has more than a suspicion of verisimilitude about it; they looked to me more like a field of pointed haystacks. And, when abandoned, they are usually transformed into lairs for venomous snakes, hence the unwillingness of the natives when called upon to break them open.

It may or may not be a sub-species of *E. triodiae* who is known in the Northern Territory as the "Hiding Termite": though, under this name, it is not to be found in any book of reference. He builds his castle behind a clump of trees. It may be asserted that the trees grow around it after it is built, but such is not the case: the castles are too often seen in the making, and the timber is, as a rule, long-established.

But as *E. triodiae* also builds in the open it is



A DOOMED AREA, CENTRAL AUSTRALIA: CASTLES OF H. MERIDIONALIS
(Copyright, Nat. Travel Association, Melbourne, Australia)

possible that I am mistaking him for *E. pyriformis*; there is no ruling on the subject, but it really does not matter. The salient point is that the blind architect, without appearing above ground, first finds a protective group of trees, which will effectively conceal the citadel he proposes to build. Then, with his assistants, he will lay out the base, co-ordinating its area to the height of the trees, which he cannot see, so that at no point will the apex of the highest tower be visible behind its perennial shelter. He then co-opts the rest of the Workers and builds his citadel, twenty feet into the air. That would be the procedure in the ordinary course of events, did we not know that there is never a visible leader among the Termites. When we are told, however, that the otherwise insoluble enigma of "how it is all done" is explained by the blessed word "instinct" the secret becomes intelligible to the meanest understanding. And . . . no one else.

Although the style of architecture adapted by these insects differs in every quarter of the globe, there is a family likeness discernible in many of their finished exploits. In Western Australia, however, there is one illustration which stands alone. There have been evolved in the Kimberley district mounds whose grotesque effects have no equals, constructed by Termites of whose identity I am not certain. They resemble a pyramid of grey soap-bubbles or bulbous excrescences swelling from a central heap, or thrown together irregularly on a fifteen-foot base with their outer surfaces twisted and contorted beyond any pretence of uniformity.

So that when walking round one of these massive hillocks, the observer gets the impression of bizarre outlines of men and animals and demons, hideous beyond the dreams of Hogarth. Indeed, the builders of these curiosities might well have been jeering, as they toiled, at the caricatures of men and beasts they were creating. Inside, these red-brown masses are inferior in constructional design, and a third of the City is usually stuffed with forage.

The rainfall of North-western Australia is notoriously fitful and there are, sometimes, long periods of drought. In places, the local Termite is an unfailing weather-glass, and as a foreteller of rain far more reliable than any barometer. Thus, when Workers are observed to come into the open daylight and labour furiously at repairs or extensions it is a sure sign of heavy rain impending within a day or two; hence their anxiety to finish their task before the weather breaks. This is a sight confined, as far as I know, to Australia alone.

In the southern parts of Western Australia, where the soil is wholly sandy, an unidentified species occupies low, black mounds in the jarrah forests of the interior; it does not attack wood, and as the karri and jarrah forests are gradually cleared of timber, these Termites, which appear to be of a lowly class, often desert their nests or are driven from them. They are then taken over by birds, and it is not unusual to see a beautiful blue kingfisher flitting in and out of the nests, where they have taken up their abode.

It has been noticed by many travellers who have come into contact with the aborigines of Australia

that they evince no liking for termites as an article of diet. They eat, with relish, snakes, lizards, rats, mice and the large fat grubs which lurk in the bark of many trees, but the delicacy for which the African native craves holds no attraction for them. It may be because the insects have a different and less palatable taste.

But I have seen the Kimberley natives breaking off pieces of the cells, full of eggs, and munching them like so many honeycombs. When asked why they ate earth, they answered that it appealed to them; in other words, that it was good "tucker."

I do not think the Australian people realise what a wide field for Termite research lies at their doors, which would well repay investigation. For there seems to be a dissimilarity in many respects between the insects there and in other parts of the world; a divergence of habit and many alterations in their form of life. In point of fact, the aim of all Termite communities in Australia seems to be to create impossible situations, and then to devote all their energies to ways and means of overcoming them.

Consider *H. eucalyptus*, a curious variant of his type, whose name is sufficiently explanatory. He builds no mounds or castles and is content with a haphazard sort of existence underground. Thence, he runs covered ways up eucalyptus trees and attacks them.

Before the flighting of his nymphs and for their better defence and safe egress he builds cylindrical tubes to the surface, which, underground, are connected with a maze of intricately designed cells, so

involved and topsy-turvy that any intruder would inevitably lose himself and be slaughtered before he could regain the surface.

It may be said with perfect truth that much remains to be learnt of the daily life of every family of Australian Termites.

CHAPTER XX

INDO-MALAYA

"The social life and transformation of the different forms found in these nests is very remarkable and has puzzled naturalists from the earliest ages."

—W. W. Froggatt.

THE story of the Termite in India is one long tale of disaster; from the earliest days of the John Company, its officials were grievously afflicted by the race of insects known to them only as "white ants." And since, in their ignorance, they took no precautions against this self-inflicted scourge, their bungalows, clothes, saddlery, documents and official files were mercilessly destroyed.

Fifty years ago the summing-up of a sarcastic judge in a case brought before the Indian High Court contained the following words: "The plaintiff ought to have produced vouchers for his statement, but he accounts for the absence of this all-important evidence by the fact of the documents having all been destroyed by white ants. These insects, it is true, are very destructive, and particularly so in ———. And although it is quite possible that valuable records should be destroyed in this manner, because it is known that white ants' destructive faculties are indiscriminately applied, that insect not being able to distinguish between what are and what are not

valuable documents, yet it is a very remarkable coincidence indeed that in this case the ants should have made a selection of documents and devoured only those which were applicable to this case . . . the most conclusive evidence of all is that of witness No. 10, who deposes to having seen the white ants in the act of destroying the very documents alluded to."

I do not know what preventive measures—if any—are being taken to-day to correct this lamentable state of affairs, beyond building Termite-proof offices and bungalows and enlisting the services of chemists with a view to discouraging the insects, but however optimistic this latter effort may be, its success is more than problematical.

However that may be, it has been a time-honoured custom in India, from days immemorial, to describe the disappearance of any Government property, and a good deal of private, to the ravages of "white ants." The historic instance of the H.E.I.C.S. official in Rangoon who reported the loss of four tons of copper rods as due to the insatiable appetite of the local Termites, is a case in point.

If it were possible to draw an estimate of the damage done by them in India during the last hundred years, it would represent a colossal figure; the cash value of the depredations debited to them would probably pay the National Debt. A species known as *Odontotermes obesus* is chiefly responsible.

India is so densely populated that one looks in vain for the huge mounds, castles and hillocks seen in other countries; only in the south are poor imitations to be seen. Although, in the north and the

Central Provinces, small conical hills and mounds are common, an obvious inclination towards self-effacement on the part of the Termite is noticeable throughout the country.

It has the distinction, however, of housing a very ancient type which inhabits old tree-stumps in Kashmir at an altitude unfrequented by any other species. It is to me extremely significant that any form of Termite should be acclimatised at six thousand feet above sea-level. If once the Termite accustomed himself to colder conditions than those he now prefers, the effect on human life would be incalculable. At the moment he shows no intention of doing so, beyond this and another example of his adaptiveness in South Africa; but who shall say that in the course of centuries he will be so complaisant as to refrain from colonising in cold climates?

It has been stated elsewhere that *Hodotermes* lives and thrives on the North-West Frontier, though why he should be confined to that terrain and one province of South Africa alone, disdaining all intervening countries, mystifies all investigators.

The soil of India is honeycombed by many varying types, so numerous that a repetition of their families and generic names, as far as they are known, would be mere waste of time. In any case, an authoritative census has never been made of them, chiefly because the process of compiling one would necessitate digging up, if not all India, at least the greater part of the peninsula. Bengal enjoys the dubious distinction of providing a home for *T. taprobanus*, a small castle-builder. As a subterranean

dweller, he is probably to be found all over India. In the neighbourhood of Hyderabad in Sind, I found evidences of energetic communities at work which upset many of my preconceived ideas concerning the modicum of moisture essential to the welfare of all but desert Termites. For no rain worthy of the name falls in that part of the province and any visible source of moisture in those sandy wastes is utterly lacking. Nevertheless, they thrive exceedingly. Desneux, the Belgian entomologist, describes four separate species found in the vicinity.

In Assam there are at least four revealed types of wood-eaters who live in (*a*) small castles or hillocks, (*b*) in mounds, (*c*) in circular surface nests like footballs lying half-buried in the soil, and (*d*) a small variety living underground in oblong cells or chambers. The last are the destroyers who eat the roots and lower shoots of tea-bushes, burrowing into the stems of the former and openly devouring the latter: sugar-cane, gram and dahl do not escape them.

It is an article of faith on some estates that bad pruning of tea results in Termite attacks; the same opinion is, or was, prevalent in the Nilgiris and in Ceylon: to an extent which makes one inquisitive as to the insects' capability of judging inferior pruning. Yet another species makes its home at the base of the bushes; a poor show of leaf renders its presence suspect at once. It is reported of this variety that heavy rainfall in an impending monsoon is certain when the Workers are detected in the act of moving their queens to higher ground.



M. DARWINIENSIS "RING-BARKS" TREES WHICH EVENTUALLY HE
DEVOURS

*(Courtesy of the Division of Economic Entomology, Commonwealth
of Australia)*

There is ample confirmation of my oft-repeated statement that many of the lower families have evolved and perfected processes of which, apparently, the more advanced are ignorant, in the fact that an unidentified Assam species has been observed ring-barking trees. Now, travellers in the Australian bush, where the same practice is universally in vogue among settlers, are always struck by the number of dead or dying eucalypti standing on land about to be cleared. The green wood is comparatively valueless, except for fencing purposes, wherefore the settler, in order that the timber may be more easily burnt, chops a broad ring of bark around the trunk, removes it and the tree immediately begins to die. This Assam Termite works on the same principle, except that he does not use an axe. He waits till storm or lightning injures a tree, possibly wrenching off a bough. Then he finds the wound, covers it with Termite earth and, using that as a base, encircles the tree with a specially constructed covered way; and under its shelter eats away at the bark. Thus the operation of ring-barking is performed as thoroughly as by any hatchet.

Calotermes militaris, who lives in India and Ceylon, has, also, a technique of his own. He attacks trees from within, so that although, outwardly, they bear no sign of injury, the trunk and larger branches are completely hollowed out, and except for the earth or clay brought there by the Worker, as empty as any drum. As the bark remains intact, the tree does not die, for a time at least, and the casual observer sees nothing unusual about it. Then tempest or

chance contact breaks it like an over-dry, hollow carrot, revealing a woodless shell.

I once saw close to the manager's bungalow, on the Bogawantalawa tea estate, near Hatton in Ceylon, at the break of the monsoon, the downfall of a large tree which had suffered this experience. It had broken off a foot from the ground, leaving only a jagged and splintered base; inside, a mass of shattered tunnels two feet thick proved the activities of the recent tenants. Not one living or dead was visible and it was plain that, warned of the impending disaster, they had sought refuge underground before the coming of the storm. Incidentally, neither Queen nor eggs nor hatching-cells of *C. militaris* have ever been found in the colonies they set up within infested trees.

Mention has already been made of the two leading families for which Ceylon is famous—*T. obscuriceps* and *T. redemanni*. Both are expert cultivators and castle-builders. Dr. K. Escherich has published the results of his many investigations in the life of the former which more than confirm my own. But the facilities placed at his disposal were superior to mine and he was able to devote his entire attention to an interesting experiment, details of which follow.

He had an artificial nest specially constructed, in which he placed a large number of Workers, a few Soldiers and two gravid Queens of *T. obscuriceps*. No sooner were the Queens placed in juxtaposition and almost touching than the blind Soldiers and Workers divided into two separate groups; the numerical proportion being, respectively, one to ten.

Presently, the Soldiers, in parties of four or five, took up positions equidistant from each other, thus throwing a cordon in open order around the Queens, whilst the Workers went off in search of the soil made available to them. They returned in units of a hundred or so, bearing pellets of soil, and on arriving at the points of assembly selected by the Soldiers, proceeded to lay the bases of what soon proved to be columns of masonry; they placed each grain carefully in position and cemented them together with a salivary solution ejected through their mouths. Meanwhile the Soldiers encircled them as they worked, motionless but for their gently waving antennæ, and regardless of their human watchers. They were obviously in charge of the building operations, and there was little difference between their attitude and that which might reasonably be expected of a human foreman in charge of a job; each gang of Workers carried on quite independently of the others.

When the columns were a few inches high, they were extended longitudinally from the base of each until they met, forming a low wall of the same thickness throughout; then the Soldiers broke up their groups and marched to and fro, seemingly urging the Workers to further efforts and impressing upon them the urgency of protecting the Queens.

Next morning they were completely surrounded except for the small entrances left open, by which they could be approached, attended and fed. And Hegh, in commenting upon this experiment, remarks: "Et M. K. Escherich termine en se demandant s'il se

trouverait au sommet une tête d'où émaneraient toutes les directives transmises aux ouvriers par des intermédiaires?"

We know they have no earthly ruler—these stone-blind artificers. Who, then, but a god of their own could be responsible for what, to us, is plainly a miracle?

As regards their method of intercommunication when at work—or otherwise—it can be seen that it is independent of any of the five senses known to us, but so far as I am aware, Escherich was the first to recognise a spiritual force in the life of the Termite for which Science has no name, of which it has no knowledge and would probably be the last to admit its existence. He says of the building ability and complete efficiency of *T. obscuriceps*: "*And yet, there must exist between them a certain psychic bond, without which the execution of a construction so uniform is not possible.*"

Bugnion estimates that *T. redemanni* takes from ten to twelve years to build a castle six feet high. These are very common among coconut plantations in the low country, and the genesis of each is an irregular series of little sugar-loaf cones, sometimes with hollow depressions in the summits, whence will presently arise a stately citadel; it will be noted that this principle and that of *T. obscuriceps*, whilst under control, are identical.

There are many other varieties of Termites in Ceylon which are regarded with disfavour by planters and Sinhalese alike—the most destructive types being confined to the lowlands or country less

than three thousand feet in altitude. Among the jewellers of Colombo, termite earth is in demand for polishing jewels; it is said to be of a fineness superior to any other polishing medium and . . . there is no difficulty in obtaining it.

* * * *

Thirty-four years ago, whilst serving in the Federated Malay States Government, I had every opportunity of studying the local Termites, in the jungle and nearer at hand. At certain seasons of the year and during the heaviest rains, when the lamps were lit at night, all our bungalows were invaded by swarms of winged Alates. We had no mosquito-proof, wire-gauze-guarded quarters in those days, and, not infrequently, the dinner-table had to be swept clear half a dozen times of struggling and de-alated insects. Apart from falling into one's soup at the evening meal they gave little trouble, and the local coffee-planters made few complaints about them.

Either coffee did not interest the Termites or, as sometimes happens, the wealth of felled timber left lying about among the coffee-bushes supplied them with sufficient food. Coffee in Malaya fell into disrepute and rubber (*Hevea braziliensis*) took its place; very soon the crudely-cleared estates, thick with fallen trees and rotting timber, gave place to cleared, well-ordered plantations.

Then the Termites, who had increased and multiplied in proportion to the quantity of cellulose available, were at a loss for further sustenance. Con-

sequently, they turned their attention to rubber and have kept it fixed on that succulent growth ever since. It followed as a natural corollary that Man, having once more upset the balance of Nature, is now busily occupied in seeking for poisons potent enough to eliminate, chiefly, *Coptotermes gestroi*, the worst offender.

The process of extermination, in his case, is not difficult because his home is easy to localise, usually underground and, as often as not, beneath the rubber-tree he is attacking.

Gestroi has a preference for living trees, and is partial to mangoes, coconuts, Java almonds and *Hevea* more than nine months old. When he deserts or is compelled to leave his home, the fungus in the galleries, left to its own devices, shoots to the surface and there develops into enormous mushrooms.

Another slightly superior species, *T. gilvus*, also flourishes in Malaya, the archipelago, Burma and Java. He is an agriculturist, living under small mounds and in trees; he is also found in the mountains under the four-thousand-foot level.

If the Termite is regarded as a pest infliction to tropical agriculture, he is at least one which Man has inflicted upon himself; if as an antidote to Man's activities he had not been available, Nature would have found another. For when she observes Man forcing the growth of any form of vegetable life in the tropics, on a large scale, she soon finds a corrective. Thus, there arrives out of nowhere, destructive fungi, such as killed out coffee in Ceylon; boll-worm and weevil in cotton; mealie-bug in

coffee; beetle in coconut-palms, scale and fungus in citrus; the list might be easily extended. But the Termite only proclaims his presence when encouraged to do so.

At this moment a letter, dated a month ago, from Nyasaland, lies before me. My correspondent and friend, writing from Limbuli, where he is managing a tea-estate, advises me that "the termites are cutting down young tea, two feet high; they are severe on maize, tobacco and rose-bushes; my blue-gums, coffee and cotton have not yet been attacked."

Yet, were it not for the extraordinary development of the planting industry in Malaya, the Termite would have remained to this day what he was in my time, a comparatively unobtrusive nonentity content with the leaf mould and woody stuffs provided by the detritus of the jungle.

CHAPTER XXI

THEIR DEPREDATIONS

"The biologist, indeed, is amazed, not at their numbers, but that, given these advantages, they do not more nearly saturate their possible environment and destroy available wood more promptly and more completely."

—S. F. Light.

IT seems difficult to mention Termites apart from their devastations; on the other hand, any attempt to confine an account of the toll they take throughout the world to a single chapter would be impossible. I have not followed that course, but as the damage they do is connected with every aspect of their lives and is quoted, with extreme bitterness, whenever their names are mentioned, a general view of their destructiveness may not be out of place.

Primarily, it may be said that there is no need to hark back to earlier civilisations for proof of it throughout the centuries; we have ample evidence in our own time. Nor, since this is not an entomological treatise, is there any necessity to complicate the issue by meticulous identification of the various families or even genera responsible for the present unpopularity of the race. No planter, farmer, maharajah, or industrialist is interested in the terminology of the insect which reduces his belongings to dust.

Yet some elementary knowledge would be useful to all persons associated with the Termites; it would save them the expense of unprofitable experiments and needless worry. For example, nearly every South African landowner is convinced that the great castle-builders, which sprinkle his property with landmarks, are to blame for all the assaults made upon his more intimate effects; he also believes implicitly that if he can only disinter the Queen from her hidden fastness all trouble and trespass will cease. It has already been shown that neither hypothesis is tenable.

It should not be forgotten, however, that the blameless insect of to-day may develop, to-morrow, into a destructive agent of immense and hitherto unsuspected potentialities. The morals of the denizen of one country, and one family, often differ from those he professes in another.

Sixty years ago Termites were found in the Palm House at Kew Gardens; and I have seen, by the courtesy of the officials of the Isoptera Section, Museum of Natural History, South Kensington, flooring board attacked by a wood-dwelling species after it had been laid in position in an English country house. The fact need not give rise to any apprehension; the Termites' system of central heating will have to be considerably improved before he can withstand an English winter. And the dry-wood species are not interested in the conservation of heat.

There is no reason, however, why he should not do well in certain parts of Cornwall; he would be a rash man who would deny his capacity of adapting himself

to west-country conditions once he was given the opportunity of doing so. At the moment, few people of these islands are interested in the Ter/nite; but, as we shall see, in the United States, for good and sufficient reasons, the insect is better known and greatly feared.

Eleven types of *L. lucifugus* have been found in Southern Europe, in different stages; they live in wood and exhibit a pronounced predilection for oaks and fir-trees in Spain; in olives and fruit-trees in Sardinia and the South of France. In Portugal and elsewhere in the south, *R. flavipes* is to be found, with the same destructive tendencies. We meet him again in Northern Africa, where there are no great mound-builders. In Algeria, Tunisia and Morocco there exists, also, a variety of *Eutermes*, none of whom, however, do much damage in these dry areas. Nature has overcome them through the agency of the desert, as in a few hundred years, and by the same method, she will restrict his energy in South Africa.

It has been stated elsewhere that the Termite was probably responsible for the strength and solidity of the ancient tombs of Egypt; it may be added that of recent years he has been limited to well-defined areas and has become localised to an extent which renders him a negligible quantity in many parts of Lower Egypt. In Upper Egypt his presence is emphasised by the virulence of his onslaughts upon the handiwork of Man; it is known that he has devastated whole villages and driven the inhabitants to seek fresh fields and uninfested pastures new.

He is no stranger in the Sudan and the eventual

appearance there of the more destructive species seems assured, but no man can guess the intentions of the Termite even if he lives beside him: very little attention has been paid to him in that part of the world in recent years. When the Abyssinian highlands are settled by white people—and the plateau in which Lake Tsana is centred contains some fine grazing country—special precautions will have to be taken against the Termite, for in that land his power is not yet fully recognised.

It is not unlikely that the new owners of the country will inaugurate these officially, thereby pointing a moral for the benefit of our own Dominions and colonies, in sub-tropical and temperate zones, whose rulers are quite content that private enterprise should seek and pay for the discovery of preventive measures against Termite attacks.

Enough has been said, perhaps, to indicate the growing threat of the Termite in South Africa, but a few illustrations of his interference with human life may not be out of place. On the Berea—the residential quarter of Durban—I know of more than one private dwelling where portions of the interior wooden columns supporting the ceilings of the living-rooms are often clay-filled shells held together by a skin of wood and paint. They are to the casual observer intact, and sufficiently strong to support the beams they under-pin. Yet, if leant against with undue pressure, these ornamental, enamelled or painted posts not infrequently collapse; the invisible Workers have come up from the ground and without giving a sign of their presence, have made away with every atom of the

heart-wood. The columns are renewed, but human ingenuity is only capable of repulsing the invaders temporarily; it is impracticable to insulate the house, and sooner or later they will return and demolish the substituted post. And so on *ad infinitum*.

No delicate plants may be planted in the gardens of the Berea except in pots, tins or tubs, having no contact with the soil, and, working on a large scale, *T. natalensis* has now taken to assailing growing *Mimosa* (*Molissima decurrens*), the Black Wattle of commerce. This is a new revelation of his activities brought about by the sowing of enormous areas for the production of a tanning medium.

It is a common thing in the countryside of Natal for the wooden floors of unfrequented huts and houses to crash when a footstep falls upon them. I have seen furniture, trunks, shoes, and clothing destroyed in temporarily closed dwellings, judged to be immune because they were built clear of the ground on brick or concrete piles. For the Termite, awaiting, one might say, his opportunity and being perfectly well aware that the dwellings were for the time uninhabited, had run his covered way from the soil, up and over the solid piers, and gained access to the rooms through some obscure crevice hidden from all but him.

An English newcomer to Natal, knowing no better, built a picturesque summer-house in the large garden of the farm he had purchased outside Maritzburg. He thatched it with tambookie grass, which is tough and reed-like, and although he found that farming allowed for small leisure to sit in summer-



COVERED-WAY APPROACH BY *R. ACTUOSUS* THROUGH METAL SHIELD
TO TIMBER ABOVE

*(Courtesy of the Division of Economic Entomology, Commonwealth of
Australia)*

houses, he was gratified to see that for three months at least his achievement retained its pristine prettiness. In six, it had acquired a closely-shaven aspect, for *Hodotermes* had been busy in cutting away the sides; thereafter, the red clay runs of other species began to show through the grass, giving it a singularly moth-eaten appearance. At the end of the first hot weather the summer-house looked so disreputable that the disgusted owner put a match to it. The remains of straw, uprights and thatch went up in a flare of flame and smoke, which left behind it four walls of red clay and a skeleton roof of the same material; they have been replaced by a steel Nissen hut which has so far survived.

The first railway lines in Africa were laid on ordinary wooden sleepers; they were promptly devoured. Others, treated with creosote, coal-tar extracts, treacle and arsenic and various empirical solutions, lasted a little longer, but, sooner or later, met with the same fate. Steel or iron hollow sleepers were substituted, which, although they discouraged the Termites, were found unsatisfactory in other respects. Since when, huge sums have been spent in importing specially resistant jarrah, karri and other expensive timber. At the moment I am not conversant with the latest preventive measures employed on the South African railways.

Many tests have been carried out with a view to ascertaining the immunity, if any, of the native woods of the country; very few have withstood a three years' test, and none of the controlled results appear to me conclusive. Much, if not everything, depends

on the infestation of the ground where the tests are made, existent food supplies and climatic conditions. In some of the experiments the sap-wood only was eaten, the heart-wood left untouched; even the presence of surface ants constituted a factor visibly affecting the controls. Whatever the results attained—and economically speaking, they were of no great value—it is certain that no known variety of timber would be Termite-proof in the valleys of the Tugela, Umkomaas, Inanda or the White Umfolosi; the same verdict applies to many thousands of miles of upland and high-veld country.

It has already been stated that *T. natalensis* does not forage over and above his daily ration-seeking; he waits, apparently, until informed of booty on a large scale. Thus, a house in Natal built of concrete blocks was left vacant for some months, a year or so after its erection. The owner returned to find the inner wall of one room marred by a series of broad tunnels rising from a crack in the creosoted floor to a point half-way up the wall. Inspection revealed a beam of wood let into a tier of the concrete blocks, either deliberately or by inadvertence on the part of a careless workman. Being lime-washed and distempered it had been invisible even to the owner of the house. But the Termites had found that beam, which was a mere shell, for its interior had been completely devoured.

Another instance of their uncanny power of divination occurred during my stay on the Natal coast, at a country house in notable Termite country. It was a large, roomy and beautiful stone-built house. During

my visit one of the family had occasion to absent himself for a few weeks and left a collection of half a dozen pairs of shoes neatly arranged in line in his first-floor bedroom. News of his leaving must have been carried immediately to the Termites under or in the neighbourhood of the house. For when he returned a gallery had been built from a tiny hole in the wainscoting, which was unharmed, direct to their quarry. And the shoes were enshrouded in one long clay mound like a tombstone; whilst within the tomb were gnawed and ragged wrecks and shreds of what they once had been. Wherefore, the owner of the shoes became aware that the native servant, whose duty it was to look after them, had obviously neglected that room.

It should be added that neither the house itself nor anything in it had previously been attacked, and that the owner, accustomed as he is to their mysterious ways, is still wondering how they heard of that pin-head hole and the treasure awaiting them beyond it.

Many years ago, when Tanganyika was German territory, some of its settlers, most ill-advisedly, as I told them at the time, planted thousands of acres of Ceara rubber. The adverb is used intentionally because although *Manihot Glaziovii*, grown in that country, shows a good habit, its output of latex is negligible. On one of these estates—some hundreds of acres in extent—between Dar-es-Salaam and Morogoro, the Ceara trees, as their healthy appearance indicated, had flourished exceedingly. When the district was evacuated by the German owners in 1915 and the estates were left to their own devices, word

went forth in the Termite world and a uniform and concerted attack was made upon the trees. As, till then, they had never been molested, one infers that the Termites were well aware that they were safeguarded by human care and attention.

At the end of the War, every tree—there were tens of thousands of them—was completely enveloped in a mantle of red Termite earth; they looked to me like a dense jungle of methodically arranged terra-cotta poles.

It was, in this as in other instances, as if the God of the Termites had said to them: "In such-and-such a place you will find food in plenty. Forthwith you will make provision for an enormous increase in your numbers, so that you may deal with it accordingly."

During the building of Elizabethville, in the Belgian Congo, that wonder city in the wilderness which was to outrival Johannesburg—and has not—the contractors found to their surprise that a most important factor had been neglected in framing their estimates of cost. They had forgotten the Termite. But the local varieties of the race were not slow in reminding them of the oversight. They seized upon all the stacks of squared timber and every bit of un-insulated wood and gave the contractors good cause to regret their negligence. Estimates of additional cost due to their ravages reached fantastic figures.

Here is one night's experience of a friend of mine, Wilfred Robertson, told in his *Rhodesian Days*: "The dawn came at length; I got up and reached for my boots that stood beside the bed. They were plastered all over with sinuous tunnels of moulded red

earth; seeing them, I remembered how that special type of soil is always beloved by the termite—the voracious white ant that will eat everything except metal.

“Quickly I shook off the daga and turned the boots over, exposing several deep grooves chewed by the termites along the soles. I was thankful the damage was not worse, also that I had not now many more miles to cover; better than the predicament of one who raised his boots to find the soles completely eaten away except for the nails.

“I shouted to the cook boy to bring my morning tea. He brought it and moved a carrier box to place it on; the wooden bottom of the case nearly fell out, for half of it was eaten away. Chimuti came forward to roll up my blankets; he pulled off the top ones and I heard him exclaim. The doubled blanket that had been under me was a rag, a net that fell to pieces as he lifted it; and the freshly cut grass mattress below was a maze of earthen tunnels and a moving mass of blind, white termites striving to hide from their enemy, the light.”

The invasions of St. Helena in 1840 and again in 1875 by *Leucotermes tenuis* have passed into history; few authorities or amateur naturalists can refrain from mentioning them—they are so much nearer Home. Brought from South America in some trading vessel, they quickly made themselves at home on the island, increasing and multiplying exceedingly. Houses, merchandise and movable property were destroyed mercilessly and without warning. For *L. tenuis* is an unobtrusive animal living in hidden

galleries who does not seek publicity. Longwood, once the residence of Napoleon, has been partially destroyed by them more than once; on the occasion of my last visit there, ample proof of their presence was painfully apparent. Only last year (1935) the French Government despatched a mission charged with their destruction, or at least empowered to take all possible preventive precautions against future assaults on the premises. The latter may be achieved, at a price: the former—never.

Among fourteen species in the Far East, *Coptotermes formosanus* is notorious for the damage he accomplishes from the Philippines to Japan. He bores through mortar, and in addition to everything else of an edible nature, masticates sandstone, and likes it. He takes up his abode indifferently in wood, walls or underground, and is unpopular even in the Chinese Empire, whose inhabitants suffer most things gladly.

In the South Seas, *Reticulitermes flavipes*, amongst other breeds, eats sugar-cane, coconut palms, houses, verandas, fences, plants, and other things. Trading schooners and similar craft have carried him far and wide over the Pacific: he was most probably a passenger from San Francisco, the capital of his home country. His sphere of influence ranges from Hawaii to the Marquesas, from Asia to Oahu, where *C. formosanus* is equally to the fore. Both species have gone so far on the road to civilisation that they have acclimatised certain fungi in their underground galleries. The problem of the Termite in the Pacific in the near future will be a very real one. So

far *C. formosanus* has not succeeded in returning the compliment by invading the American coast, but Mr. C. A. Kofoid is under no delusions as to what would happen if and when he does. "The question as to the survival of this destructive species, if it should be introduced on the Pacific coast, is a very important one. The fact that it infests wharf structures, enters packing-cases and establishes itself in the woodwork of steamers favours its transport from Honolulu to other ports, especially on the Pacific coast. The swarming of this destructive Termite occurs at night, and the alates are attracted by light. In one instance they entered a lighted steamer at the dock, the doors and windows of which had been tightly closed to exclude them, through a pipe several feet in length and of small diameter."

It is claimed in Australia that *R. flavipes*, who is firmly established on the Western Coast of America, followed a party of surveyors across the table-land of the Flinders River, attacking the dead wood resulting from the blazing of the trail. What really happened was that he was already inhabiting the country, and only gave proof of it when Man, as usual, invited him to demonstrate his existence.

Under *Eutermes*, mention has already been made of Termites who are endowed with the power of secreting noxious fluids and emitting them at will. In Australia—that land of paradoxes—this faculty appears to be very highly developed. I do not know if it has occurred to any other observer, but I find it passing strange that the Termite is the only animal of my acquaintance, of vegetarian habit, who is invested

with the gift of distilling a highly toxic secretion, and . . . using it. Snakes, scorpions, lizards, centipedes, spiders, and even platypi, all of whom have bitten or stung me, are carnivorous or, at least, insectivorous. Except in times of stress, Termites are strictly graminivorous. Perhaps, when we learn how our own glands function, the mystery of this will be revealed.

Hagen first discovered that certain species exude, at will, a liquid which corrodes metal and glass; he correlates the talent with a gland situated near the rectum. Saville Kent confirms this, and adds that at Wyndham, in Western Australia, bonded stores were raided by an unidentified species which perforated the leaden capsules of wine and beer bottles, to get at the cork underneath, "so that the contents were wasted." At Port Darwin, he saw heavy sheet lead penetrated by the corrosive fluid distilled by Termites, so that the coveted timber underneath could be exploited by the insect. It must be realised that this particular Termite was not only aware that food lay behind the leaden sheeting, but that, having made sure of its whereabouts, it set to work and manufactured a solvent as penetrative in its effects as nitric acid, which ate its way through the metal and opened a passage to the cellulose; specimens of this type of handicraft can be seen at South Kensington to-day. It would almost seem that those who, in derision, deny the Termite's God, must at least admit his intelligence, even though frantically proclaiming that it is far inferior to our own.

Coptotermes lacteus is another genus established

in Australia, who, as an industrialist, seems to have gone beyond all precedent; he has proved to be a most destructive being; he not only secretes a milky juice like some of his confrères in other countries, but, like *Nasutitermes*, fires it at his enemies. In 1896, he ate up the Australian Museum; now, although his favourite home is in unfrequented spots on the earth's surface—on and over tree-stumps, for instance—he has taken to the ground wherever Man has encroached upon his territory. Of late years he has been detected in organising raids upon potato crops and eating whole fields of them—a new departure in the long list of delinquencies of which he is already guilty.

Fiat justitia, and beyond this lapse from grace the Termite must be held blameless of at least one crime. In all my experience he has not once been accused of devouring the food of Man, in any shape or form. Wasps revel in the fruit pulp and saccharine mixtures we know as "jam"; bees delight in our synthetic or their own honey; flies go cheerfully to their deaths after dabbling in chemically preserved milk, and ants are absolutely broad-minded in their dietetic views where the eatables of Man are concerned, but the Termite disdains them all. This hankering after a potato diet is a new departure, and has probably to do with some starch-*versus*-proteid health fad which is being given a trial.

CHAPTER XXII

AS BENEFACTORS

"Nowadays when we resent the toll they levy upon us for our interference with their inheritance and regard them but as plagues and pests—a destructive force to be contended with—it is well also to bear in mind that from the point of view of Mother Earth they are not altogether the encumbrance that they appear."

Drummond's Theory propounded by
Claude Fuller.

BEFORE Man arrived at his present stage of evolution and was able to realise and appreciate the paramount importance of his status in the Cosmos, he ate Termites. His black, less cultured and not so self-satisfied relatives are doing the same to-day.

Though we have no means of proving it, *Pithecanthropus*, shambling through the jungle, must surely have drawn largely on the termitary for his food supplies; it is only reasonable to suppose that since Pleistocene times there has been no diminution of the practice on the part of those who live, rawly, in the immediate neighbourhood of Termites; apart from what we can observe, all the evidence points to this conclusion.

One visualises him—this prototype of ours—as a hairy, low-browed, chinless, bent-backed, neckless presentment of ourselves, crouching with brutish

head sunk between hunched-up shoulders beside a well-stocked mound or monticule, tearing with long, curved talons at the cemented clay. Peering, as does a baboon, from slits of eyes overhung by great bony eyebrows, into the strongholds of his prey, he differed only in hideousness and a degree of initiative from his—and our—simian cousins who now afford the same spectacle almost anywhere in the wilds of Africa, for those who care to witness it. Or for those who being so inclined and sufficiently interested, contrive to break open a hillock belonging to subterranean Termites and abandon it to the tender mercies of attentive monkeys or baboons lurking in the neighbourhood.

Chattering at the prospect of a feast, snatching, when the time arrives, at the unfortunate Workers and Alates, careless of the Soldiers' grip upon their marauding paws, they cram the insects indiscriminately into their greedy mouths. But, scrabble as they may, they never reach the sanctuary, where lies the lethargic queen, with her store of eggs, chiefest delicacy of all. That privilege is reserved for Man and the Ant-bear.

Hence we have the quaint conceit that the idea of tools first occurred to Man through the difficulty his ancestors experienced in opening Termite castles: when finding their talons unequal to the task they utilised sticks to force an entrance. After the success attending their efforts the evolution of the lever would be a simple matter.

Pithecanthropus and the ancient men of Piltdown, Peking, Heidelberg and Rhodesia have gone, leaving

only vestiges behind, but however vague our conception of the lives they led, it is fairly certain that they may be identified with the Termite; although, unfortunately, the insects have left no fossilised remains behind them.

But in the communities of black persons, whose habits and customs so nearly resemble the cave men's, there is no lessening of the interest evoked by each successive seasonal fighting of the Termites. As a Bayere chief, who, calling on Dr. Livingstone, was offered apricot jam, remarked: "Ah, you should try roasted Termites." So, in Central Africa, natives welcome the rainy season in very much the same way as obese British gourmands hail the advent of the oyster season and journey from afar to gorge themselves at Colchester on living food.

The Baganda, also, prefer their Termites alive. When the alates leave their homes—a contingency which has been long foreseen—as often as not, they only rise from the bases of their castles to collide with a sheet of bark cloth spread over their summit by the natives. The impact breaks off their wings at the sutures and they fall to the ground within the curtain in white, struggling masses; their wings, a shimmering mass of iridescent membrane, being swept aside by nimble human hands in the process of being sifted from their late owners.

Men and women scoop them up in handfuls, eating a few occasionally, savouring the flavour much as an alderman would deliberate upon the taste of a new season's dredging. Naked children shrieking with delight vie with all the birds of the neighbourhood,

wild or tame, in chasing and collecting stragglers, munching as they run, stuffing themselves to repletion, heedless of the acute diarrhoea which will presently disorganise their interiors.

Casati, an Italian official of some note in Equatoria, in Slatin Pasha's time, has left on record some observations on the Termite, which, although varying to some extent from my own experiences, are of passing interest, if only indicative of the danger of accepting native views on natural history. They told him that the alates emerge from their homes on hearing the song, "Anyeku me kotu," meaning, "Come out in numbers like raindrops," an invocation more than liable to failure unless the Termites were, in any case, ready to leave their homes and were on the point of flight. The beating together of sticks and the stamping of feet near likely outlets were also recommended as incentives to urge the insects to come and be killed. Both methods are empirical to the last degree.

Similarly, an English-speaking Baganda mission-boy once informed me that by means of a watering-pot or its equivalent, a perforated petrol-tin, he could persuade the alates to leave their birth-places at any time of year, irrespective of their own wishes or immaturity. He said he just watered their mounds and they did the rest. When I pointed out that they could not fly if their wings were not developed and that, in any case, such a paltry subterfuge would scarcely deceive the God of the Termites, who had them in his keeping, he protested his superiority. "What? Them dam insex got a soul like me? Not

bloody likely." From which Shavian rejoinder I gathered that he was a back-slider from grace; assuredly he was a liar.

Casati identifies, near the Makua river, no less than five species of *Termes mordax*, a genus unrecognised by Hegh in his stupendous work on African Termites. Moreover, he invests Mordax with two distinct types of alates, which rather upsets all preconceived notions of classification, involved though they are and always have been. He says that the larger of the two emerges at dusk and is known as "King's Food," the smaller comes out at any time in the rainy season. The native names for them suggest nothing, and it is presumed that two different genera were in question.*

Since it is impressed upon us by those who are paid to instruct us that there is nothing brutalising about taking any form of life provided Man can eat it, or wear its skin; and while Man, the astonishing egoist, unquestioningly accepts the utilitarian theory that the "lower animals" were all evolved for his special benefit; we cannot well criticise the Baganda who hold that a compost of Termites mixed with maize or millet meal is an appetising dish worthy of any king. Native epicures, however, since the necessary pans were introduced into the country, prefer them fried. Thus doth civilisation progress.

Yes, it is safe to assume that through all the ages primitive people have eaten Termites. As regards others, it was not of savages that Dante wrote:

* *Ten Years in Equatoria.*

"And afterwards as bards of yore have told
The ancient people were restored anew
From seeds of emmets,"*

When it is realised that until a few short years ago Natural Historians mistook the Termite for an ant, unwitting of the fact that he was not even a blood relation, one cannot wonder at laymen miscalling them "emmets," "pismires," and such-like; for the rest, their eggs are still a delicacy.

Smeathman, the doyen of termitologists, speaks in a kindly fashion of Termite flavour. He likens it to sugared marrow; some of the friends who accompanied him into the bush were even more enthusiastic. They detected in the taste of the alates a resemblance to sugared cream, almond paste and similar fantasies. White men of my acquaintance, who have ventured upon the experiment, have not responded to their epicurean allure in the same way; they are mostly non-committal: though many young white country-bred South Africans speak highly of it.

In West Africa, Termites are mixed with meal, moulded into cakes and sold in market-places; when in a dried condition they are sometimes powdered and made into an infusion alleged to simulate coffee: it would appear to anyone wanting in a vivid imagination as a poor substitute! In the Congo territory and Central Africa desiccated Termites, if legends mean anything, have provided a dish renowned from the earliest times.

* * * * *

* *Inferno*, Canto XXIX.

So far we have seen how useful the Termite can be and has been to Man throughout the ages, in a personal and material sense, and how, to this day, he is helping to keep alive an unimaginable number of black people: no doubt to some good purpose, though, from an unprejudiced point of view, it is impossible to guess what that purpose may be. As regards their economic value, which would appear to be more assured, I was once approached, in Tanganyika, by a gentleman of alien extraction, who offered, if I would take charge of it, to finance an expedition having as its object the discovery of new sources of Termites' eggs, preferably places where the insects would be found breeding on a colossal scale. When asked to what end, he replied: "Chicken food; for export to Europe." I have often wondered if he found his El Dorado.

Apart from his food value to Man or beast, the Termite fulfils in tropical and sub-tropical countries a far greater and more important part in the economy of Nature. Wood, as everyone knows, is little affected by the elements, and then only through the agency of fungoid growths after a period of years. Left to itself it takes a long time to perish. And were it not for the presence of the Termite, it would take much longer and the soil surface would be littered with the unabsorbed detritus of many decades. Fallen trees, with their boughs and branches and all the rubbish Man leaves behind him in his wanderings, would, in the process of rotting, encumber the earth indefinitely. The Termite does us the good service of removing it all. Or, as Kofoid says: "Among insects Termites

accomplish a unique function in the scheme of nature by their assistance in returning this resistant wood to the air and soil from whose chemical constituents it took its origin."

In addition, the castle-builders, in respect of breaking up the soil beneath the surface, act in the same way as the more lowly earthworm, but on a far greater scale. Further, they aerate and invest it with certain chemical values, the presence of which is obvious to the more unobservant spectator. There are few "mealie-lands" in the Transvaal, Natal or the Free State which do not afford ample evidence of the site of one or more extinct Termite cities. Ploughs and harrows may have scarified these fields for many years, but where these settlements have been, the growth of the crop is always more vigorous, the healthy colour of the stalks more striking and persistent where once the underground chemical factory was at work. In my own cultivated fields, either high or low veld, these islands of tall flourishing maize stood forth like green oases long after the main crop was yellowing toward the harvest. But for the energy, industry, and chemical knowledge of the Termite, the fertiliser responsible for the improvement of the crop would still be lying about the country in the shape of insoluble timber or waste vegetable matter. Moreover, the Termite manufactures humus and renders it available to fungi and bacteria, who then bring it into a condition suitable for plant food. Lastly, they bring up the sub-soil, and no farmer need study Darwin to learn what that means to his industry.

There is not the slightest doubt that the cotton-growers of the Sudan, both native and alien, are greatly indebted to the Termites. It is to them, indeed, that all who benefit by the annual flooding of the Nile riverine country owe, to a great extent, the wonderful fertility of their soil and the yearly replenishment of the constituents thereof. My conviction that such is the case is based on personal observations in Egypt and Abyssinia: lest these should appear inconclusive, and because confirmatory evidence has a more convincing effect, I quote Dr. A. T. Hayes *in extenso*.*

"I formed the opinion that the White Ants have rendered valuable service to Egypt by amassing the fertile mud which is carried down to the Nile basin and venture to put forward the following consideration in support of the theory.

"On entering the Abyssinian border land one cannot help remarking the stratum of the ground. Our track lay generally along watercourses and the beds of dry mountain torrents. Here the soil was composed of sand, shingle and pebbles. On either bank and for some distance beyond lay an expanse of basaltic stone on which little earth was to be seen. Grass grew there, but by no means so abundantly as in the plains, and there were climbing plants such as convolvulus and ivy, which clung to nearly every tree. These creepers made the path extremely difficult to follow. Farther away from the watercourses lesser vegetation and longer grass appeared. The White Ants' nests from nine to twelve feet in height were found here, usually

* *The Source of the Blue Nile*. Dr. A. T. Hayes.

close to a soft-wooded tree. The roots of it in most cases had been attacked by the insects and converted into 'white ant earth.' The trunk afterwards undergoes the same process, and by the advent of the rainy season only the outlying twigs remain intact. A heavy gust of wind will overthrow the simulacrum of a tree. The rain falls in torrents and the compost which the insects have made of the timber is broken up and carried by innumerable channels into the tributaries of the Atbara and finally reaches the main stream. It is well known that the Atbara brings down the greatest quantity of this mud; the Blue Nile carrying less and the White Nile—the most sluggish stream of the three—least. The two more rapid rivers rise in Abyssinia in regions where the White Ant is extremely destructive to vegetation. Moreover, the innumerable ant-heaps are made entirely of earth which crumbles under the Rains . . . and are swept into the watercourses in the season of floods. And, in the dry months, the Ants, besides devouring straw and the bark of living trees, eat into every branch and twig that the past storms have brought to the ground. Carrying earth into their excavations they hollow the wood, as in the case of the soft standing timber which they attack and leave just the outer covering intact. I have often stooped to pick up a stick for the cook's fire and found that my fingers broke a thin shell of bark and scattered the contents. Another circumstance which seemed worthy of remark was that we found no deposit of 'Nile mud' within the Abyssinian border, nor any earth resembling it; some may conclude that as soon

as the Atbara, when in flood, reaches the level of the Sudan, it spreads a deposit of this fertile soil beside its banks, though the great mass is carried down into the Nile.

"According to this view the fertility of the alluvial districts of Lower Egypt is in no slight measure due to the detritus from Abyssinia, and the White Ant has contributed an important share to the resources of the Nile Valley. Of course, I do not for an instant contend that all the mud deposited by the river in Egypt is supplied by the White Ants, but I believe that the wonderful productive property of the alluvial deposits is due to the work of these insects in the Western borderland of Abyssinia. Therefore, in my belief the White Ant has justified its existence, though its room is infinitely preferable to its company."

I will go farther and add that a good deal of trash is brought down each year by the floods. When the waters recede, much of this is left on the banks and is promptly encased in Termite earth. At the rising of the waters, the Termites leave it and disappear above high-water mark; but the tons of fertilising agent they have produced is incorporated in the successive freshets and swept down to the lower lands to do its part in the enrichment of the cultivated portions. Barrages may hold up the more solid silt, but the waters must be saturated with its generative quality.

If it be true that German chemists have discovered a method of extracting proteids, fats, oil, sugar, and

other edible substances from wood, it must be conceded, in justice to the Termite, that so far as the chemical constituents of these products are concerned, he anticipated the process, of necessity, long before he became a xylophagous animal. Had he not known of the food value of wood, he would scarcely have become interested in it.

Man is indebted to the Termite for thousands of tennis-courts and miles of pavement—which he could not otherwise afford—both laid down with the cement-hard earth of their castles. Using the same material, he has manufactured millions of bricks of a superbly weather-resistant quality and has built innumerable houses in districts where clay is not and vlei sods unobtainable.

But, to estimate the importance of a life in terms of food or economic values is, to me, a cold-blooded and heartless proceeding. Having launched upon it, however, it is as well to dismiss the inference that Man, of whatever breed or colour, is the sole beneficiary of the Termites' existence. For many members of the animal world batten—and fatten—upon them.

In addition to those to which reference has already been made, the Ant-bear, Aard-vark or *Orycteropus*—that queer and otherwise harmless beast—is their worst enemy. He has a long, bald snout and tremendous claws, is the size of a small long pig, and lives exclusively on Termites. When attacking them, he burrows down to get at the more densely populated parts of the City, and usually destroys it completely. When the Termite abandons his custom of building castles and mounds, not only where the blighting

influence of Man affects him, but elsewhere, the poor Aard-vark will starve, because he will be unable to find his daily bread. Even now his is a "somewhat precarious existence. He breeds in the great cavity excavated by himself on the site of an exploited City and after producing a family is, as often as not—and certainly in the Low Country—gravely disconcerted by the arrival of a python, which promptly assimilates the young ant-bears, who are too blind and weak to escape. And thus are the kindly intentions of Nature fulfilled. Similarly, in the Congo, the dusk-flying bats gorge themselves with Termites to an extent which makes them easy game for the natives, who, in turn, devour them.

In the Cape Province and elsewhere, mierkats sit around the outlets of the Alates and catch them as they emerge, taking care to avoid the Soldiers' mandibles. Mr. W. F. W. Fitzsimons, of the Snake Farm at Port Elizabeth, says that the silver jackal is addicted to eating *E. trinervius* and that this species is also the favourite food of the jumping shrew-mouse of the Cape, an eccentric animal with the trunk of a miniature elephant. Lastly, though the list of their enemies is by no means exhausted, the pangolin of the Congo, that scaly and unprepossessing beast who looks like a replica in miniature of an antediluvian animal, is by no means averse to a meal of Termites, despite his devotion to a diet of true ants.

THE TWO AMERICAS

I

"Among all the classes of insects there are few the study of which has been more neglected than that of the 'White Ants', and this in spite of the fact that in tropical countries they are of exceedingly great economic importance."

•

—Watts and Mann.

Pests and Blights of the Tea-plant
(1903).

IN their realisation of the gravity of the Termite problem, so far as its industrial and economic importance is involved, the United States are far ahead of all other countries. They have good reason to be, and, for them, the effective control of the insect provides a task which grows in magnitude with the years. Certainly they have progressed in successful research far along the road to definitely assured preventive measures; and the resultant methods of dealing with the Termite, *in esse*, or as a prospective aggressor, have been placed within the reach of all.

It is no exaggeration to say that the best brains of the chemical and entomological world of America have applied themselves for many years, without stint of either time or money, to arrive at this consummation. Their research work still continues. In 1928 a

tangible proof of their combined efforts was given by the formation of a Termite Investigation Committee, an organisation the title of which explains itself. For property owners who had suffered, or expected to undergo attacks, did not need the alarmist rumours current at the time to convince them of the gravity of the threat overhanging California by reason of the many reported destructive feats of the Termite.

Long before that date, they had been recognised, of course, in Western America; sundry and manifold schemes for suppressing had been propounded, for years, by well-meaning amateurs, whose lack of scientific knowledge was very much akin to that of the South African "pestological experts," who, to this day, rashly undertake to exterminate the Termite on each and every opportunity afforded them—with negligible success. If only because the Termite Investigation Committee has, in the public interest, consistently deprecated the misplaced energy of these interested individuals and revealed the hollowness of many of their claims, its genesis has been more than justified. But the Committee has done far more. It has concentrated on preventive measures of its own devising: it has carefully tested every specific submitted to it and reported fully on all, and it has endeavoured to instil into its public an appreciation of the manner in which Man, by his own policy, has tacitly encouraged the expansion of Termite life in the Western States.

Because, until quite recently, and over wide areas, timber has been the sole building material employed for many years, whole forests have been felled,

seasoned and brought into the heart of the Termite country. Myriads of wooden buildings have been constructed, many in direct contact with the soil. These have forced the fact of their existence upon the Termite, who, one must reiterate, following his usual routine, has procreated countless hordes to deal with the harvest; enlarging at the same time his territory and sphere of action. And Man's illogical resentment at this perfectly legitimate result is costing him, in terms of cash, and in connection with farm buildings only, some thirty-seven million dollars annually.

There are fifty-five species of Termites in the United States, of which twenty-two belong, nominally, to the less advanced families. But even those who have been accorded relationship to the highest type, the Termitidæ, are a long way behind their aristocratic African kin, in development, culture and the art of social service. Thus, there are no genuine castle-builders or mushroom cultivators in North America and no Royal Cells, such as have been described as peculiar to Africa and Indo-Malaya. Nevertheless, all the varieties under notice are, with only one or two exceptions, aboriginal inhabitants of America, who have been established there since the dawn of Time.

Biologically, and apart from anatomical distinctions, there is little difference between them and other members of correlated groups to which they belong, settled in widely separated lands and living under varying conditions; their life cycles are identical. But, economically, and because of the extensive depredations of which they are guilty, they are of absorbing

interest both to those who live in contact with them and to the scientists whose aim it is to alleviate the effects of that continuity.

As in other countries, the subterranean varieties are the worst offenders. Amongst them, *Reticulitermes* and *R. flavipes* and three other genera are particularly active in their ill-doing. The first-named genus is recognised as being most prevalent on the Pacific Coast, from British Columbia to Southern Mexico; his detractors claim that he is the most destructive species in the United States, and the statement is generally accepted in all good faith. Possibly he is a scapegoat and the sins laid at his door may be the handiwork of others. If that be so, here, again, the perplexed layman comes into conflict with the dogmatism of Authority, until one wonders whether the whole system of Termite classification the world over should not be revised. Dr. S. F. Light and Mr. A. L. Pickens, Field Biologist to the Termite Investigation Committee, put the position more clearly:

"The species of the genus *Reticulitermes* are badly in need of careful study and revision. The available descriptions and diagnoses of the species are inadequate or incorrect. It seems probable that careful collecting and comparative studies will show the presence of new species in some areas and perhaps show some of the previously named species to be invalid. A general key is not feasible in the present state of our knowledge."

Whether he be incorrectly labelled, occasionally, or not, *R. hesperus* is one of the most rapacious of subterranean Termites. The Queen has no Royal Cell, nor

is she cribbed, cabined and confined to the jealously restricted quarters allotted to her African sisters. When she and her consort weary of one apartment underground they move to another; not being of ultra-physogastric habit there are no obstacles in the way of this feat. Except that they are more dependent on moisture conditions, in that their physical welfare demands more water, there appears to be little difference in essentials between their mode of life and that of other subterranean varieties, though mentally, and in regard to the higher culture, they are, of course, vastly inferior.

It would seem, indeed, the flighting time of the Alates is governed entirely by the rainfall: no rain, no mating. A report by Mr. Pickens, which I had not seen when describing the African bridal flight, is so curiously similar that, with permission, I quote the following section of it:

"As the rain soaks downwards into the soil above or near the colony, the whole group is attracted upwards to the new supply of moisture and will even work toward it through a dry layer. The Workers do most of the excavating. They are attended by a small guard of soldiers. If any foreign insect attempts to gain entrance into the burrows through the newly opened exits, the Soldiers aid in despatching them by means of their long, sharp mandibles. Behind these groups of guards the winged Alates orient themselves with their heads pointing toward the newly opened doorways. As the upper layers of the soil are warmed by the sun they are drawn toward the surface and, crowding and squeezing, swarm into the outer air. If

the sky is flecked with clouds, the alates collect about the entrance of the burrow while the sun is obscured, but when the sunlight strikes the opening, the whole group springs into the air and flutters towards the sun.

"The flight is weak and the direction is largely determined by the prevailing breeze; most of the insects soon sink to earth in the immediate vicinity, though a few may flutter upward for sixty feet and be borne along for as much as two hundred yards. Many do not fly aloft at all, but drop their wings while running about on the ground. At times these wingless ones apparently feel the impulse to fly as the sun warms their bodies, for they leap vainly into the air. Those that have been aloft settle to the earth and raising the rear of the abdomen, push it against the wings, which break off at natural sutures near the thorax, leaving four little stumps. The females now take up a passive position with the abdomen raised high in the air, increasing the area of visibility and probably emitting an odour which is attractive to the males. The latter rush about the surface hurriedly, one by one coming in contact with a female. When a pair thus come together the female depresses the abdomen and the male follows as she leads, the two proceeding in tandem sometimes joined by a third and even a fourth insect, the whole moving along like a train of cars. At times, in turning, the leader curves so far to the right or left that she finds herself behind the last one of the train and the group revolves for some time in a circle. Again, the male may become separated from the female leading him, in which case she stops, re-elevates the abdomen and waits until he

or another male joins her before proceeding again."

It is due to the fact that more attention has been paid to Termite life in America and that scientists have been given ample opportunity of studying it that we owe the exact knowledge they have acquired. One interesting fact, not so obvious elsewhere, is connected with the reproductive phase. Owing to the scarcity of unoccupied terrain, the inception and growth of a new colony are chiefly dependent on the ability of the founders to hold the site they have chosen after deciding upon its suitability. For a newly wedded pair in scooping out a home for themselves are always faced with the danger of trespassing on a settlement of strangers who would make short work of them. It seems that it is not unusual for several colonies of *R. hesperus* to impinge upon each other's territory and fight until one band has defeated all the others. The victors then kill off all their rivals' reproductives, who have taken no part in the fray, leaving one pair of their own to carry on as King and Queen, of not only their own party, but of the survivors of the vanquished, who have been permitted to live. In short, *R. hesperus* is violently antagonistic to members of other communities, even the same family or genus. Under control conditions in California, they attack each other, off-handedly, on being introduced and fight to the death. They are no less pugnacious in nature and battles on a large scale where no quarter is given are of frequent occurrence.

The marvellous prescience of the blind Termite working in the ancient Egyptian tombs has its counterpart in modern America, and confirms the theory that

the mental attributes of the insect are not confined to one continent or species. *R. hesperus* corroborates the evidence of five thousand years ago, by the hanging galleries he builds to connect, downwards, with some coveted material. Further, he employs the same stratagem of building into space, in his aerial tunnels rising vertically from the ground for the same purpose: not with any idea of mound-building or for a home, but with the sole intention of obtaining food. It has been noticed that both these aerial links are formed of a woody compost, far lighter than that used for surface connections and are structurally superior when ample moisture and a high temperature are accessory to the insects' efforts. Examples of these pendent runways sometimes exceed three feet in length from the base at which they started to the objective when attained. As regards the upward, vertical approaches, Dr. Pickens is of opinion that they are built in the flighting season to facilitate the exit of the Alates, a theory connoting, perhaps, far more intelligent forethought on the part of the Workers than if their object had been the more material one of securing food.

R. hesperus and his relations are responsible for the major part of the damage done by the race in the Western States; and not only there, for during 1932 no less than sixteen hundred and forty-six cases of attack were reported in thirty-seven States, Florida and Virginia showing the highest percentage. He employs the same method of founding new colonies as those in force elsewhere, but the system of subterranean colonising seems to be growing in favour.

So much so that one is prompted to speculate on the chances of his family relinquishing the fighting process and confining themselves solely to underground development of the species, by means of secondary substitutes. Anyhow, he is pushing his exploratory tunnels far afield to-day, so that a pair of this caste, if desirous of founding a new settlement, may retire to their uttermost limits, excavate a nest and set up housekeeping. It is held that the foundation of these substitutional colonies results in the quicker growth and development of the inmates than those set up in the more risky if entirely orthodox fashion followed by the light-seeking alates.

The engrossing experiments of the Termite Investigation Committee's scientists include many revelations, which might well have been brought into prominence earlier, had any facilities for doing so been afforded to British naturalists. Yet it is doubtful if the habits and customs of a self-effacing, cryptobiotic insect like the Termite can be regarded as normal when he is placed under control. The inferences drawn by Pickens, who has made an exhaustive study of *R. hesperus*, otherwise known as the "Western Subterranean Termite," might not be equally applicable to the insect in his native habitat. Certainly they indicate a depth of savagery which I have not observed among the higher families. Strangers introduced by me into established communities have not met with the same reception as that recorded by him, although it was never a friendly one. He remarks, with reference to a number of artificially housed parties of different castes: "All

efforts to have a group of workers adopt a queen have failed. Primaries introduced into a strange colony are immediately set upon by an aroused mob and chewed to a pulp, which is mixed with macerated wood and buried on the floor of the gallery. Attempts to segregate the primaries with workers from their own colony are not successful, the reproductives eventually disappearing. With secondary reproductives no better results are found. One group of wingless Workers segregated for four months killed within twenty-four hours a secondary queen thus presented."

Certainly the cannibalistic propensities of American Termites seem to be acerbated by being kept under control; the lack of some vitamin in the blotting-paper on which they are fed is probably responsible. Termites were at work when I was in San Francisco, twenty years ago, but their wholesale depredations are of comparatively recent birth; in the last earthquake, a great proportion of the buildings which collapsed at Long Beach and Santa Barbara was found to be badly infested.

Hardly less troublesome in the Western States are three notable genera of the *Calotermitidæ* family; known, colloquially, as the Dry-wood, Damp-wood and Powder-post Termites. It must not be assumed that "Dry-wood" adequately explains the first named, for with the amazing adaptability of his race he has accustomed himself, when necessity arises, to other modes of living; he may be found in the dead branches of living trees, in damp wood underground, and even in retreats of a semi-subterranean nature;

we will treat of him in the first instance as an occupier of sound, dry timber, his favourite abiding-place.

He is found, in this environment, distributed over a narrow belt extending from North Carolina, dipping to Florida and rising again through Mexico and Arizona to Northern California. The most common variety of the breed is *Calotermes minor*, but he is by no means the most harmful. In the days of his youth the alate of this genus follows very much the same routine of development as do his better-bred relations, except that the technique of his courtship differs somewhat from theirs; he also suffers from more nervous tension at that season than do the alates of *Termes*. On leaving their birthplace they are obsessed by a feverish anxiety to get rid of their wings; and, following de-alation, they rush over the ground or fallen timber, aimlessly, it would appear, but, in reality, with the sole motive of finding a mate as quickly as possible. Their antics are described by Light as follows:

"The wingless reproductive runs rapidly hither and thither until an individual of the opposite sex is encountered, whereupon both stop abruptly and stand with heads very close together, moving their antennæ back and forth continuously over one another's heads. The king makes advances toward the queen, the queen striking at the king with her head. After four or five such overtures, each of which is followed by a pause during which the termites stand facing each other with their antennæ fanning slowly, the king is accepted or rejected. If he is rejected, the queen turns and runs quickly away and the king goes in the opposite

direction. If, however, the king is accepted, the queen turns quickly and speeds away with the king in close pursuit. Although the queen runs rapidly⁶, the king keeps close to her and, when they become separated, as sometimes happens, the king rapidly regains contact with her. . . . After pairing separation seldom occurs. It is usually difficult to frighten members of a pair away from each other, and it appears that they seldom, if ever, leave one another for other mates, even though a number of unpaired termites are near. Instances have been observed of interference by an unmated king with a newly mated pair, but the union did not appear to be seriously threatened."

There is a distinctly human quality about this insect courtship, a counterpart of which, ignoring physical distinctions, might be seen on Hampstead Heath on any Bank Holiday; indeed, there seems little to choose between these two exponents of the amatory art, Insect and Man. For one may be assured that by means of the psychic power with which both are endowed, the successful wooer has described to his bride the glories and riches of the home in which he will presently install her, and that he has expatiated at length on his own superiority in a marital sense.

Else, why the rejected suitors, when there is no physical distinction between them and when it is revealed by microscopic examination that they are all triumphs of mass production, unvaried by one solitary characteristic?

CHAPTER XXIV

THE TWO AMERICAS

II

"Our present knowledge shows that the runways of the American subterranean termites through the ground are far more extensive than ordinarily believed. These passageways spread rather generally through the ground and are probably dug in search of new food supplies. The groups of termites infesting one piece of wood, or one location, appear to live quite locally either in or near the wood attacked. However, they are evidently well connected with the complete colony through an extensive system of ground passage-ways. If this is the correct understanding of the system by which subterranean termites live, ground treatments may kill the local termite group infesting a particular location, but it is quite hopeless to expect thus to kill the entire colony system or to make the ground completely free of subterranean termites."

—M. Randall and T. C. Doody.

"Report to the Termite Investigation Committee" (1934).

COPTOTERMES minor and all his allied genera make their homes in the crack of a beam, a "shake" in timber or in the crevice of a dead bough; he and his mate scoop out a recess in whatever specimen of wood they select for the purpose, very much after the style of the subterranean species

working in the earth. They always seal it against intruders after boring a small aperture for sanitary purposes. Hidden in their dark retreat they would be secure indefinitely, were it not for this concession to hygiene, which, resulting as it does in the expulsion of a number of minute faecal pellets, invariably signifies the presence of the insect within the timber.

Zootermopsis augusticollis, the Damp-wood variety of terrestrial, as opposed to subterranean, is the largest of all the Pacific Coast Termites: he is a primitive specimen of the race, and, ethically speaking, his social system is not outstanding; although, in practice, he displays some of the cruder virtues. He has no Worker caste—a handicap in itself sufficient to damn the breed from a democratic point of view—and depends on his Soldiers and reproductives for all his requirements; the former are particularly pugnacious and formidable in appearance; they sometimes exceed three-quarters of an inch in length.

In habit they differ from the Dry-wood species in that it is essential to their well-being that the moisture content of the wood they infest must be more pronounced: for they are peculiarly sensitive to drought conditions. Their habitations, anywhere between British Columbia and Mexico: California is full of them. They have a preference for tree-stumps and fallen timber and are usually found in decaying wood. A desert damp-wood variety has been found attacking young citrus trees in California; another played havoc with the Oaklands wharves some years ago and devoured a considerable part of the timber-work.

Another specific type, *Cryptotermes brevis*,

commonly known as the "Powder-post," is no less infamous. He burrows in telegraph-poles, fences and other outdoor timber, but his energies are chiefly concentrated on furniture, books, and fabrics; he is a true house-dweller. Physically, he is smaller than most of his kind, and for that reason, perhaps, the Soldier caste does not flourish the repellent mandibles with which his superiors are provided. By way of recompense, his family have developed short, squat, armoured heads, and with these, at the first alarm, they plug the entrances to their homes so that no foe may enter—pacificatory gesture, which, if somewhat lacking in dignity and liable to misconstruction, is no doubt approved by the League of the Termite Nations.

This genus is widely distributed throughout Central America and the West Indies; some years ago a large hotel in the Bahamas was found to be, as to its interior, completely in their possession, whilst, without, *Nasutitermes* were at work on the foundations. In order to prevent the formation of other colonies, it was recommended that building and contents should be burned to the ground. Cases have been known where furniture occupied by these insects had been sold and conveyed to other establishments, where they set up further infestation.

Wherefore, the officials of the Canal Zone have now taken steps to stop the movement of any suspected timber in the region under their control. If anyone sells a wooden chair to another it has to be tested to make certain that there are no trespassers ensconced within arms, legs or framework.

Little is known of the Termites of Mexico, except that they are there in strength and capable of doing much damage. Possibly the comparative aridity of the central plateau retards their development and discourages them from becoming a serious menace. Forty-four genera have been identified, including both Dry-wood and subterranean species.

The flooding of the Gatun Lake and the cutting of the Panama Canal itself must have brought disaster to the Termite population of the Zone, but doubtless the survivors quickly supplied the deficiency and were more than recompensed by the extra food which always accumulates in the presence of Man. For, according to T. E. Snyder and J. Zatek, "Termites will always constitute a serious problem in Panama." Not only do Dry-wood and Powder-post, which are extremely difficult to suppress, flourish in Central America; we meet again *Amitermes* and others of the mound-building families. But they do not excel at it: their execution is faulty and their blunt, sugar-loaf, lop-sided cones lack uniformity and are mere parodies of the African finished works of art. From this part of the world went forth *L. tenuis*, who devastated St. Helena; he and his friends eat not only wood in any form, but living fruit-trees. Cases have been reported of their boring through the lead sheathing of cables, resulting in the short circuiting of the current and necessitating extensive repairs.

Here, also, are the arboreal carton-builders, the *Nasutitermes* of higher lineage, for whom it may be said the tropical jungle of these latitudes, set in a hot, steamy atmosphere, affords an ideal home with every

opportunity of further and persistent development. To-day the round, metal shields fixed in the piers on which modern buildings are erected, are a visible proof of the apprehension with which the Termites' presence is regarded; they are a familiar sight in the Canal Zone. For, failing these and similar protective measures, every form of cellulose-containing material is attacked at some time or other. In the Antilles, Haiti, Cuba and Porto Rico, *Nasutitermes* and *Calotermes* prevail over all the forces of Nature in the amount of damage they accomplish; in Saint Thome they eat the trunks and branches of the cacao to an extent which makes them more feared than the Wrath of God.

E. pilifrons in Jamaica has succeeded in distilling and perfecting the art of discharging an offensive secretion which paralyses, more effectively than any other similar fluid all insects with which it comes into contact; moreover, he has improved upon the domestic economy of his fellows, by storing the communal provisions in large, solid masses of varying shape in the exact centre of his arboreal nest.

It has been left on record by Alexander von Humboldt that he rarely saw books more than fifty years old in Northern South America; the Termites, it was said, ate them long before they attained that age. Other peripatetic philosophers, generalising more freely and wanting, perhaps, a sense of humour, have gone further and evolved a theory, contingent to that famous traveller's revelation, which might be taken to have its repercussions in modern times. They assert that persons who live in the tropics are deplorably

lacking in brains, because books are essential for the development and exercise thereof. The Termites eat all the books as fast as they are brought within the tropics. Ergo, the Termites are responsible for the stupidity of Man in those latitudes. It is a quaint, if somewhat far-fetched, conceit and conveys an imputation which Pundit Gandhi would probably resent.

Southward from the Isthmus of Panama there is little diminution of the Termite population, although, so far as a very limited study of the various species has shown, their idiosyncrasies differ a good deal. In Paraguay, a variety held to be identical with *C. lacteus* of Asia and Australia builds castles: and no less than four genera of the *Eutermes* sub-family have cut adrift from tradition by attempting to improve upon Nature and aspiring to a peculiar form of physical culture. It would seem that, at some time of their history, these genera decided to adopt strictly pacifistic principles. So they permitted their mandibles to atrophy, or at least to become modified to such an extent that they became useless for fighting purposes. As a further result of their resolution, which must have been maintained over untold ages, these weapons became contracted in width, extended in length, and, in order to afford more leverage, bent and hinged in an extraordinary manner. So that now their owners, using their mandibles like rat-trap springs, leap like mountain goats, and, faithful to their creed, make themselves scarce at the first alarm or sign of threatening danger. Information concerning the life-history of these queer insects is scanty and vague: little

is known of them beyond the fact that they have been duly classified.

The same might be said of a neighbour of his, *Rhinotermes latilabrum*, who has two types of soldiers, Major and Minor, with a unique armament of their own; they have indeed endeavoured to combine the employment of chemical warfare with their ordinary weapons—and succeeded. The mandibles of the Greater Soldiers are of normal shape and size, but between them, where ordinarily *Eutermes* would carry a hollow proboscis, is a long, horny, pointed trough. It looks like an exaggerated and lengthy lip curled into a semi-open tube, and from this a fluid poison is ejected or spilt. Thus, the Soldier can get a grip of his enemy—though the margin between tips of syringe and mandibles is but slight—and by squirting a lethal dose over him, where he cannot miss, put his opponent out of action. Just as a sword, made some hundred years ago, carried a short pistol sunk into the hilt, whose barrel was parallel with the blade and no doubt caused many an unpleasant surprise in those days. It may be noted that the Minor Soldier of this species has only vestigial mandibles and is obliged to rely solely upon his chemical armament.

The Matto Grosso is famous for its Termite life; there are at least twenty-seven species found within its far-flung borders. One of them, *Mirotermes*, a robber, has gone far on the road of worldly progress as conceived by Man. He is invariably found with others of his tribe living as a small community in possession of a portion of the home of another underground species. Once installed there, he seems to

abandon without shame all the most cherished traditions of his industrious race; he does no work worthy of the name and exists on the food he steals from his host; he is a past master of thievery far excelling the exponents of the profession in other parts of the globe, among his own people. Apart from their tolerated trespassing, it cannot be said that the *Mirotermes* family of the Matto Grosso keep on good terms with their hosts: their intercourse being confined to raids on the latter's stores. When detected, they bolt to their pirated quarters, without offering any explanation. It is unlikely, therefore, that they secured a footing in the first place by force of arms; more likely they sneaked in when the rightful owners were not looking. Reference to these transgressors has been made elsewhere; it only remains to add that for sheer effrontery and as a thief and a parasite, *Mirotermes* has no parallel in the Termite world, however commonplace his ideology would appear in the history of Man.

The singularity of this specialised form of existence lies in the fact that very rarely are two different species of Termites found living together in perfect amity, as these appear to do, so long as one can run fast enough to get away from the other; it is a truism to say that almost without exception each holds aloof from all other families, genera or species. In this they are distinct from the true ants who have no such prejudices.

Incidentally, South America has another claim to the doubtful honour of housing a large number of Termitophiles, or insect parasites, of extraordinary

variety; Professor Silvestri has made a special study of them. He found that flies and beetles which became physogastric after inflicting themselves upon the different communities in which they are found, show a wonderful diversity in size and shape. Swollen as in Africa into grotesque and horrible parodies of their original forms; deformed and distorted likenesses of unnatural beings, they lurk in the corners and byways of a City, some walled into pens of their own, others, apparently free to drag themselves where they choose, these parasites eke out a revolting existence comparable only to a living death. Wasmann likened certain of them to the fatted pigs kept by Man, the only difference being that whereas the pigs are slaughtered, sooner or later, for the benefit of their keepers, the *Symphiles* who produce sweet exudates for the stimulation of their hosts and thereby earn their board and lodging, live, so far as we can judge, indefinitely.

It is not improbable that there are hundreds of vices and virtues connected with the Termites of South America of which we have no knowledge whatsoever, and from which no analogy may be drawn when considering their relatives in other parts of the world. One instance will suffice to point the moral. There has been discovered in Brazil a species, the king whereof, not content with a single queen, has been found living in a harem of at least a hundred. Such an example of open and flagrant concubinage must militate against any over-estimation of the Termites' character, as I have endeavoured to portray it; but in justice to the race as a whole it must be recorded that such moral lapses are confined to South America alone.

So, through Brazil to the savannas of the Argentine and contiguous countries thronged with Termites, we arrive at length at the southern geographical limit of their wide-flung domain; it is surmised, though unproven, that its latitude approximates to a line drawn from Patagonia, south of the Cape, and on, along the 45th parallel to Australasia. Very much the same limits apply to their northern habitats, though the boundary is much farther south throughout Asia: in British Columbia, *R. hesperus* has reached the 46th parallel and for all we know may be working still farther northwards.

A celebrated naturalist has stated that the Termite cannot live in a temperature falling below 20° Centigrade, and has thereby exemplified the danger of dogmatising where such a mysterious being as the Termite is concerned. I have found them flourishing in an outside temperature of 10° Centigrade; and observed that a heavy snowfall lying for ten days on the surface has not inconvenienced them; they have climbed to 6000 feet above sea-level in South Africa and the Himalayas, and in both localities the winter thermometric readings fall far short of authority's estimate. In neither case do the Termites involved possess the knowledge of central heating, limited to the higher families of City-builders, but, if they can adventure, with impunity, into a temperate zone, it is unwise to question their ability to adapt themselves to even more stringent conditions.

Science judges the Termite by his physical attributes and ignores his mental acquirements absolutely, although it is obvious that those to whom the

systematists have ascribed pride of place in their terminology are the more civilised of the race. This, of course, may be mere coincidence, and despite the fact that the wisdom of the Termites is by no means confined to the inferior families.

We know what the Termite has done, although we are ignorant of the processes he employs, and whose orders he obeys; but we have not the slightest conception of what he is capable of doing. Personally, I am assured that if in the next few score of years he saw fit to eat up the wheat crops of the world nothing that we could do, at present, would prevent him.

Ignoring for the moment, however, such a contingency, it is certain that the painstaking efficiency and thoroughness of the research methods of American scientists will leave no stone unturned in their attempts to defeat the intentions of the Termite, wherever suspect. They have already accomplished an enormous amount of preventive work in particular regard to buildings. But when the sources of the Termites' food supply are cut off: when every building is so perfectly insulated that approach to either exterior or interior woodwork would be impossible, it cannot be expected that they will not turn, literally and metaphorically, to other fields of enterprise.

CHAPTER XXV

MAN AND THE TERMITE

I

"Dost thou not perceive that all creatures
both in heaven and earth praise God. . . ?
Everyone knoweth his prayer and his praise:
and God knoweth that which they do . . .
and unto God shall they return."

—Light. Revealed at Mecca.

El Koran.

IF it cannot be conclusively proved that the Termite antedated the earliest form of Man—long before Pithecanthropus—the evidence points, nevertheless, to the assumption that when the first Ape-man stood upon his two feet he found the Termites waiting for him. How long he had waited need not concern us, although a fossilised specimen of *Calotermes rhenanus* at South Kensington, dating back to the Miocene, might well be the precursor of more ancient types still to be discovered.

If, however, at that period, the Termite had already discarded his wings, sought his subterranean refuge and dwindled from a much larger type to the comparatively insignificant form he now presents, there can be no doubt that the Trinil and Rhodesian Man ate him with avidity, even as their putative descendants do to-day. (The conjecture as to the

Termite's original size, "before he was driven underground by the surface ant"—another surmise—is justified. For we know that giant dragon-flies, with a two-foot span of wings, flew about the air in the Lower Oolite and that Hymenoptera existed even earlier.)

Ignorant though we may be of all the intervening human and semi-human races which inhabited the earth, we come at last with some degree of certitude to Neanderthal Man, contemporaneous but unrelated—it is believed—to the progenitors of modern Man, the Cro-Magnon and other allied breeds. It is difficult to say if the Termite served as food for these or—shall we say?—the Piltdown Man. But, remembering that these ancient folk were probably intruders into Europe from Africa, where, judging by his culture, the Termite was already established, it is not improbable.

Viewed from a modern standpoint there was nothing prepossessing about the Neanderthal, who was, above all things, a wanderer. Except, perhaps, if the remains of his burying places and the worn teeth of their inmates may be accepted as evidence, that he had a care for the aged and decrepit of his communities and that an equivalent of the Thames Embankment, in winter, had no place in his cosmos. He may have had no prophets; he certainly had a God to predispose him to good deeds.

The last Ice Age receded at the beginning of the Pleistocene; Europe became temperate, if not tropical, and, it may be reasonably supposed, overrun by Termites. And then, despite his brain, as large as

our own and, possibly as receptive, and a much more powerful, if unattractive body, the Neanderthal Man disappeared, forgotten by his God or overwhelmed by Nature; he left no trace beyond a few bones, mixed with those of extinct elephants, rhinos, hippos, tigers and horses. Alternatively, he may have been utterly exterminated by other races, famine or pestilence or some other cause beyond our ken. We only know that he was succeeded in Europe by a totally different type, the Cro-Magnon and allied races. Fortunately, we have been enabled to acquire more exact knowledge of this race by the legacies it has left us. Even so, it would be as well to speak cautiously of its attainments, because we are largely dependent on *a priori* evidence and may be ascribing merit to a quarter where it is not due.

We believe that the Cro-Magnon men flourished one hundred thousand years ago; we know from palæontological data that they were of infinitely finer physique than ourselves—"those splendid men," as an enthusiastic lady archæologist has described them—and that judged even by our exacting standards they had well-shaped heads and brain capacity equal to our own. We know that they lived in caves—though they may have occupied houses—and that they left in the former, to use Dr. Spurrell's words, paintings and drawings which were "evidences of unsurpassed skill in artistic production, mastery of colour and line. Cro-Magnon attained something very near to absolute perfection in artistic achievement."

They vanished in their turn and with them their culture, to mock our vain attempts to recapture it; and

with them also, a subject race, whose existence is little less than apocryphal, departed into the unknown. Beyond the few examples of their art, no vestige of their trained intelligence, their power of reasoning and achievement, was handed down to their unrelated successors, even the pattern of their weapons differed from those that came after them. But, it is safe to assume, the Termite lived on undisturbed throughout all the turmoil and clashing interests of those who sought the mastery of the earth, regulating his life according to its needs and development, intent upon his appointed task.

The Aurignacians left the stage at the height of their culture: the Solutreans succeeded them with their flints, until they too disappeared, leaving their rock sculptures and abandoned camp-sites as inarticulate witnesses of their brief occupancy of Europe. After the Magdalenian epoch of the Cro-Magnons, the Capsian culture followed, and with them the Old Stone Age came to an end. Azilians brought in the New and other and more obscure races came after them.

And then, out of the mists of grey antiquity, Modern Man, *homo sapiens*, "heir to all the ages"—in reality, inheritor to none—stepped into the shambles of the Universe. Since then, he has been proclaiming his sovereignty over the slaughter-house which is the world, and his superiority over all created things, oblivious of the fact that he was a product of æons of evolution and not a ready-made, newly-created entity.

Parenthetically, it may be said that my object in

venturing into the realms of archæology is to draw a distinction between Man and the Termite in more senses than one. Those ancient peoples standing on the lowest rung of a ladder reaching to unknown heights have not handed down to posterity any knowledge or any experience of their own, which could materially benefit the human race or assist in its admitted, if greatly vaunted, progress. Whereas the Termite, from the most primitive forms to the most highly developed, represents either a store-house of the accumulated wisdom of millions of years or is under the direction of some Power which conveys to him the scientific understanding essential to his life and indefinitely prolonged existence. I know of no heaven-bestowed properties among Men.

II

Despite the verdict of the pundits, who would treat of the termitary as an individual, no investigator of my acquaintance who has spent years in watching them in Africa, would deny personality to the single insect, with his obvious powers of arriving at a decision in an emergency, and of taking the initiative when faced by a sudden crisis. However that may be, no amount of individual thinking will result in the preponderating bulk of humanity arriving anywhere. Some years ago, the President of the British Association stressed this point, when he remarked: "Annul the work of a few hundreds—I might almost say scores—of men and on what plane of civilisation

should we be? We should not have advanced beyond the medieval stage, without printing, chemistry, steam, electricity or surgery worthy of the name . . . but the true pioneer, the man whose penetration creates a new world as did that of Newton and Pasteur, is inconceivably rare. But for a few thousands of such men, we should perhaps be in the Palæolithic era, knowing neither metals, writing, arithmetic, weaving nor pottery."

And, but for their prototype who first found that flakes of flint saved wear and tear of their talons: that a stick could be used as a lever and, later, that bronze was superior to flint, we should still be in the age when baboons or anthropoids disputed with Man for the supremacy of the wilds, or a meal of winged termites. The former won it by stealing a march on his rival and has arrived at his present predominance in nature by subduing and employing other beasts of the world and by banding with his fellows for mutual protection. Before that the baboon was following the same road; he could not keep up the pace and he will never regain it. I doubt if the human race will ever realise what it owes to the hairy, skin-clad genius who first bestrode a horse, stole fire from the sun or twiddled one stick against another, and invented co-operation. But, for the good wrought by the vast majority, they might as well never have been born. They came into the world to eat and sleep and die; in a few years they will be as forgotten as the savages to whose inspiration they owe their high station of to-day.

For they are clamant in their assertion of superiority over all created beings. Their convictions are based

chiefly on the mechanical aids to their civilisation invented by the minority: and no one disputes the engineering ability of the mathematical superman. They have reduced manual labour to a minimum and a vast proportion of their fellows are finding it more difficult each day to employ their hands and limited intelligence. But the unqualified advantages of a mechanised world are yet to be proven.

They are obsessed with the fact that a few of them have impressed the elements and some of the forces of Nature into their service, forgetful that there exist many more of which they are profoundly ignorant. Lastly—or should it be primarily?—the claim of Man's pre-eminence over all living things is based only upon his oft-proclaimed conviction that a Deity exists for his sole benefit, an Omnipotent and Merciful God, Who is not concerned in the welfare of other forms of animal life: who takes a kind, fatherly interest in every individual man, woman and child: all those, in effect, who are invested by Man with what he calls a "soul." For them the sun rises and the stars lighten their darkness: for them the seasons wane, the sea is filled with fishes and the earth brings forth its riches. Their pastors and masters do not deem it impious to arrogate to themselves the limitation of Divine Power—to say where His regard for His creation begins and where it should end, and the leaders of those sects who profess a "matyness" with their Deity, as blasphemous as it is unjustifiable, might well take a lesson from some obscure followers of Mohammed.

For there is, in the Sahara, a sect of Abadites of

Berber origin, so described after their founder, Abd Allah ibn Abad. They have withstood and seen the Phoenicians, Carthaginians, Romans, Vandals and Byzantines pass into oblivion: the Turks and Jews have not prevailed against them. And their creed, in the words of Francisco Berguinot, who has studied it, is: "The Sunni assert that the virtuous man will have among the other rewards after death, the beatific vision of God. For us Abadites such an idea is blasphemy because it presupposes that the Divine Entity can be reduced to human comprehension. God is so great and so remote from any possibility of being perceived by his creatures that to attribute to them the capacity to see Him is to deny Him." How different is such an unpretentious creed from that of the Christian queen who "refused to meet David"! In the life of the Termite, the Churches would not see the Tree of God because of the Wood of their wilful blindness and intolerable conceit.

Little is known outside Europe of prehistoric Man; in America, ante-neolithic remains are few and far between; there is no need to speak of the Sumerian, Asiatic or Egyptian cultures: they are comparatively modern. In any case, the Termite has seen them all disappear into the limbo of forgotten things, leaving only uncertain fragments scattered about the museums of the world, provocative records, more or less uncertain, in the pages of archæological works. He has been learning through all their lifetimes, and, in spite of those who hold that his development is at an end, I think he will go on acquiring knowledge until the miracles he will perform are multiplied out of all

proportion to those existent. Ice, flood and tempest and all the cataclysms of Nature have not affected him and to disease he is immune.

It is possible that the word "learning" is used ill-advisedly and it may well be so. For I am told that the Termite's tiny brain, with its few cells, is incapable of collecting facts and storing wisdom to any extent. That the *Diplodocus*, eighty feet in length and weighing about eight tons, had only one quarter-ounce of grey matter to the ton, whereas Man has three and a half pounds to his twelve stone or thereabout; the inference being that there is no correlation between bulk and brains. As for the Termite with his insignificant mental powers, how can he think and judge, forecast and decide? There is but one reply: it is done for him.

He may have no machinery, no triumphs of engineering, no complicated power-houses or harnessed lightning at his disposal, though, if he had, the mystery of his implementless existence would be little enhanced; if he actually understood the use of extraneous tools he would not be more wonderful than he is.

And he has at least evinced an intention of altering or improving upon his natural resources. *T. bellicosus* has developed mandibles, which, apart from their power of gripping like a vice and crushing like a roller-mill, can be used in a frontal attack like a stabbing rapier, very much in the same way as a scorpion uses his sting. Some members of the genus *Capritermes* have improved upon the original design of their physique by turning the same weapons into

hinged springs, and there are many more instances of modifications which cannot be treated as examples of fortuitous happenings.

The Termite has no aeroplanes and relinquished his mastery of the air when, voluntarily, he became apterous; but, within reasonable limits, he can still conquer space. Thus, responsive to an urgent call, he makes his way to a certain spot underground, remote from or within his home circle, and thence is impelled to bore his way to the surface and arrive at the exact position whence by means of an airway through space he reaches his objective by the nearest possible route. At the risk of reiteration I am constrained to dwell upon this marvel.

Think of it. A sightless entity, living in impenetrable darkness, inspired to build a hollow, two-way traffic, vertical column to connect, straightly, with a store of food in the void. Not individually, but collectively, for the incentive must be communicated to all his fellow-workers detailed for the task. "Instinct," with all its implications, however tortured into the semblance of a reasonable theorem, cannot explain this marvel.

CHAPTER XXVI

THE TERMITE AND MAN

I

"In the days of Ghiyathuddin Abulfath Omar bin Ibrahim el-Khayyami, it was reported to the Sultan Melik Shah, of Persia, that Christian priests were:— 'extremely uncivilised and primitive, dressing themselves up in beads, semi-precious stones, ribbons and fantastic garments and performing all manners of strange and magical ceremonies before their idols. They were apparently cannibals, for they ate the body of their god and drank his blood; they were devil-worshippers at heart, for they believed that the wrath of their deity could only be appeased by the torture of his so-called son; they were savage in instinct, for they went to and fro calling for blood and more blood, that their sins might be washed away in it.'"

—A. Weigall.

The Garden of Paradise.

MIRACLES are defined by Lecky as "the Divine credentials of an inspired messenger announcing doctrines which could not otherwise be established." And there was a time when the manifestation of miracles was regarded as a sufficing reason for belief in a Deity: the argument is no longer tenable. "The blood of St. Januarius may continue to liquefy at Naples, but the implicit acquiescence with which this

manifestation was once received has long since been replaced by derisive incredulity." But if a Man were born into the world with but a fraction of the Termite's inspired knowledge, that would be a genuine miracle.

Heaven-directed messengers may be at a discount to-day, but there is no dubiety about the reality of some of the Termites' messages; they are plainly written. I think the most pregnant example of their significance is addressed to those bigoted adherents of the belief that Man is the only pebble on the beach of infinity. It stands forth in the family life of the most advanced class of Termites, challenging all humanity; and, when understood, it represents the most beautiful example of unselfishness in the animal kingdom—the undeviating devotion of the elders to, and the love and attention showered on, the adolescents of every community. Contrasted with the Report of the National Society for the Prevention of Cruelty to Children, of 1935, by which one learns that there were 113,034 beaten, half-starved, verminous, sickly and deformed children in the British Isles, the example of the Termites might warrantably be accepted as a Divine message to an address where it was badly needed.

Smeathman propounded a miracle when, one hundred and fifty years ago, he wrote a paper for the Royal Society of Great Britain drawing attention to what he described as "the foremost wonder of the universe." His account of Termitic life was received with incredulity, because people thought that he was drawing invidious comparisons between them and an insect

—an unforgivable liberty. Rather should resentment have been expressed by the Termites. Since his date, naturalists have thrown such a flood of light upon their life-history, that had Smeathman been in a position to expiate on one-half of it, he would undoubtedly have been put under restraint. As it was, his sanity was questioned.

Some of the virtues of the Termite will bear reiteration in this summary. No inmate of his Cities goes in want. And here, at least, there is no necessity to draw a contrast between his and our own civilisations: the discrepancy is too lamentably obvious. If he is hungry, he asks and receives so promptly, so ungrudgingly that one may well wonder whether the first sacrament of the Moslem faith—charity—had not its genesis in the observed life of the insect.

He takes no thought for himself. No Worker lays up treasure for himself or for his own ends; rather, he denies himself luxuries brought into being by his own exertions—I exclude the lower breeds—which he might have for the taking, were it not for the self-restraint, which assuredly must be of the spirit, that forbids self-indulgence. There is no furtive concealment of property—meaning food—for the Worker's own benefit, though individual assiduity in procuring it is plainly appreciated: for those Workers who excel in untiring industry are never urged to further endeavour by the Soldiers who overlook their tasks. In other respects, and so far as can be judged, all are equally esteemed.

The energy of man, on the contrary, is devoted solely to his own interests. There is but one standard

by which he—with few and beautiful exceptions—estimates his fellow-men—the value of their individual possessions. Not that they are entirely to blame. For they are sustained in their judgments by their spiritual pastors and masters—vice-regents of God on earth—by virtue of the acquiescence of men like themselves; of whom Labouchere, no mean authority, once observed: “We are without exception the greatest robbers and marauders that ever existed on the face of the globe. We are worse than other countries because we are hypocrites also, for we plunder and always pretend we do so for other people’s good.” •

Few people will contest the reasonableness of his indictment, for doubtless he had in mind the painful truth that the teaching of Christ is the antithesis of the views of his present-day disciples. “Woe unto you that are rich,” forsooth! The priest, parson, minister or rabbi anxious and willing to hurl this denunciation from his pulpit it yet to find.

II

Among all the varied peoples of the earth, there are none that arrive, within appreciable distance, at the Termites’ conception of charity and unselfishness. For myself, I have found more honesty among the Chinese, more courtesy among the Malays and more charity among the Arabs than in all Christendom. Mercifully, for us, internationalism among the Termites is a fantasy no less unreal than among

ourselves. For, although it is the custom of any writer upon the subject to quote the "perfect communism" of the Termites and to extol it as a phenomenon unique in Natural History—the bees, ants and other social insects being, admittedly, far behind them in culture—their commune is one in name only, and the term applicable only so far as a prevailing sentiment of patriotism and devotion to the common cause of the community might be so described. Even so, a commune, like a democracy, must have a ruler or some sort of collective government. The most glaring instance of a similar state of society of the present day, set up by a horde of criminal *déclassés*, affords a case in point.

By whom, then, is the government of the Termitary represented? Not the Queen, almost an automaton: or the King—a nonentity. A Council of Workers and Soldiers? It may be so, but they have never been seen in conclave, nor have many years spent in watching them resulted in my detecting any assemblage of either or both castes gathered together in consultation. Such an event in itself would have been sufficient to call for immediate investigation. For neither caste is ever idle.

Men—if we regard them spiritually and eliminate as negligible some eleven hundred million "pagans"—have lost all caste, if we interpret the word in an hereditary sense: the only class distinction now obtaining being between the rich and the poor. And the ambition of their paid rulers, apart from the dictation of a mechanised society, seems chiefly concerned in turning humanity into the "mean and common

mould" so pathetically deplored by one of them.

Broadly speaking, most of Man's religions are based, more or less, on fear; in some of us the ghastly terrors of our childhood's hell die hard; in others they still persist; a "God-fearing man" is regarded as a saintly, much-respected parishioner, instead of an abject cur professing righteousness not for its own sake, but in order to save his spiritual skin from the fires of damnation.

Whatever the mainspring of the Termite's religion, it is certainly not the fear which is almost a controlling factor of our own. Death is to them nothing more than an incident of negligible interest when the fate of the State is at stake and sacrifice in its defence is indicated. Nor, do I think, does their creed envisage the conception of a Deity taking a personal interest in the welfare and destiny of every separate individual of the community; only Man could be guilty of such effrontery. Indeed, if the Termites have a sense of humour—and their songs and dances before the nuptial flight justify the assumption that they can express their emotions in that direction—they must surely be amused at the exclusiveness of humanity. Man, indeed, only a few years removed from his simian associates, probably provides a humorous spectacle to the rest of the world, when they are not fleeing from a demonstration of his dexterity in the art of killing. Even to me, a mere gleaner in the fields of theology, but one who has seen the cholera in India, famine in China and more than one battlefield, the idea of Man's supremacy over Nature seems incongruous.

"Are we different in any way to these?" asked Sir Melmoth Osborn of Rider Haggard, pointing to a swarm of fighting Termites. Had he asked the same question of a missionary the reply would have been, "Of course, we have souls." Indeed, such a belief is vital to the teachings of those whose living depends upon their power of convincing prospective converts that, of all creation, only they have souls worthy of salvation. Which creed is the sum of missionary endeavour.

One concedes, of course, these spiritual endowments, whilst rebelling against the monopolising of them by Man. But whilst meditating upon the appalling mental and physical misery of the majority of mankind, one is faced with the difficulty of reconciling the existence of those spiritual attributes when the general scheme of the universe, here below, seems bent on destroying them. And I am reminded of the views of my Zulu induna, N'hlutunkungu, a chief of the Isibonga of N'hlatuzi, of the Royal House of the Amatonga, who has departed, long since, steadfast in his belief of the transmigration of his soul to the body of some black mamba, to soak in the sunlight of an eternal summer.

"These teachers of yours, N'koos," he said, "tell us of a heaven to which we may aspire and at which we may presently arrive. But, if they are to be believed, none of us are worthy of such a glorious fate. Are there many among your own people worthy of such distinction, N'koos?"

And I said, in the vernacular, no; but, according to the legends there was such a Man, two thousand

years ago. But when I talked of prophets and intercessors, N'hlutunkungu was strangely irresponsible. A god he could understand, but not a vicarious deity.

"One may well believe," he said, in effect, "that the good deeds of Man are not sufficient either in quality or quantity to win him celestial felicity, but that he should try to gain it through an intercessor appears to me a childish faith. Shall not a man rise or fall by his own acts, righteous or wicked? And, if the latter, what shall it avail that he repent them?"

And I told him that because of that incredulity, unwisely expressed, white and brown men had been killing each other for the last nineteen hundred years and were killing each other to-day.

"The beasts and the Termites have but one God, as we all know," he objected; "to what end shall they employ a middleman? This talk of go-betweens seems to me mere foolishness. It is in my mind that the Termites are nearly perfect in their mode of living; my own people are far from it and of the white men, who can say?"

Earl Russell could have answered him better than I. "It is only when we think abstractedly," he said, recently, "that we have such a high opinion of Man. Of Man in the concrete most of us think the vast majority very bad."

III

It is not unusual to hear the utmost horror expressed at a sketch of the subterranean life of the Termite. Writers who have not studied it stress their

abhorrence of it in a wealth of adjectives, mostly opprobrious. They find something distasteful if not revolting, they say, in the insects' manner of living, their stark communism and their state of hopeless slavery. They are helots, cannibals and unclean feeders. These views are pure guesswork; few of those who express them have studied the Termite where he belongs; their impersonality is taken too much for granted and their type of slavery is the goal for which our own course is assuredly set. Exclude the parasites and the idlers from choice, not of necessity, and we are not far from it to-day.

The charge of cannibalism cannot be comprehensively sustained. I am aware that it is dogmatically advanced, but it remains unproven where the most advanced types are concerned. Even if it were so, we ourselves are walking exemplars of the practice and there is more than an implication of its observance in the spiritual imagery depicted by the Jewish Visionary, whose memory we revere and whose precepts we ignore. And, as regards coprophagy, have we not politicians in our midst?

At this moment, when the energies of all men living in daily contact with the Termite are concentrated upon his extirpation; when all the resources of science are being enrolled to aid them in their search for effective methods of destruction, I find it impossible to believe that they will ever succeed in doing more than frustrate the insects' intentions as applied to Man's own constructive efforts. For there must be a Divine purpose in the life of the Termite and it is unthinkable that an upstart like Man would be

permitted to disturb it, however jealous he may be in his spiritual reactions to any form of life to which might reasonably be ascribed the care of a living God.

Theorists have exhausted themselves in vain endeavours to explain the mystery of that life; more than one has hit upon the expedient of deciding that the Termitary is not an assemblage of individual beings but a separate entity composed of innumerable cells and lower forms of life very much as we ourselves are constituted. The theory explains nothing, for the Mind which governs that entity is still to seek. Alternatively, to quote Maeterlinck:

"We can, if we prefer, attribute the successive phenomena of the termitary, as of our own body, to an intelligence dispersed throughout the Cosmos; to the impersonal mind of the universe; to the genius of nature; to the *Anima Mundi* of certain philosophers; to the 'pre-established harmony' of Leibniz, with his confused explanations of final causes which the soul obeys and of efficient causes which the body obeys—reveries of genius, but, after all, with nothing to support them; or we can ascribe them to the vital force, the force of things, the 'Will' of Schopenhauer, the 'Morphological Plan,' the 'directing Idea' of Claud Bernard; to Providence, to God, to the First Cause, or even to blind chance; these answers are one as good as the other, for they all confess more or less frankly that we know nothing, that we understand nothing, and that the origin, the meaning and the end of all the manifestations of life will escape us a long time yet and perhaps for ever."

The average Man, bearing in mind the savage,

sadistic Deity of the Hebrews and the theological nightmares of the Christian Fathers, may question the reality of the God of the Termites; he may demand signs and wonders to convince him of this God's existence. Well, the paramount distinction between the miracles of the Bible and those wrought by the Termite is that the former have to be taken for granted whereas Man can go and see the latter for himself, when and as he chooses. Meanwhile, he may lay the flattering unction to his Soul, that if the God of the Universe has seen fit to sanction the survival of the Termite through all the millions of years since first it flew about the world; if He has permitted it to defy Nature who would destroy it like all living things, if she could; if He has watched the Termite develop into a worker of wonders, the mystery of which no man can fathom; it is at least permissible to postulate a future for Man also—a destiny of which he is at the moment by no means convinced—the revelation at some far future date, of a purpose now hidden—discreetly, it may be—from his view, and of which his present brief, futile and objectless sojourn on earth holds little promise. But I doubt if he will accept the analogy of the Termite.

He may rest assured, nevertheless, that when the parasites who rule us have sucked us dry, and faded into insignificance; and when the fate of Sodom and Gomorrah has overtaken the Hub of the Universe, the Termite, unperturbed, will survive.

IV

All day long the sun had shone brilliantly in a cloudless sky: for rain does fall in the winter season in the Zululand valleys, although, towards dusk, the air grows crisply chilly.

The denizens of the City knew well that late autumn was near and that the first frosts were whitening the lank, coarse grass around their citadel, for the outside temperature, of which they were fully conscious, called for the generation of more heat within. What they did not know was that Joe and Bill, before leaving the camp which was about to be abandoned, had decided, in a drunken mood, to vent their spite on the City, so long held inviolable by order of their departed manager. "First cold night we'll get even with the swine," was the summary of their resolutions.

Yet, I think, some premonition of impending danger must have warned the inhabitants, for, with the exception of those on duty, there were few stationed in the upper works of the castle when a dynamite cartridge, fired by a six-foot fuse, exploded like a bomb at its base. It blew a cloud of dust, a red shroud of clay fragments, the soil of cells and shattered gardens with thousands of dead and dying termites into the evening air.

The fumes melted away; the dust and detritus settled on the ground and a party of natives armed with picks and shovels attacked the ruins, scooping out masses of semi-suffocated insects, eggs, newly-born and half-fledged alates and all the débris of the

ruined City. Deeper and deeper they dug below the surface in search of the queen, until a small crater showed where once stood a lordly castle. For the white men, who laboured under the delusion that once she was captured all her subjects would perish, urged the men profanely to more strenuous endeavours. They stopped suddenly when the chance blow of a pick's blade in the spongy wreck of the work of ages revealed a glint of yellow-white skin gleaming through a fracture of the royal cell.

With a whoop of triumph, Bill knelt down and thrust a hard horny finger through the crack. He withdrew it hurriedly with a louder yell, and essayed to brush off half a dozen Major Soldiers who, in a last desperate effort to save their sovereign, had sunk their mandibles well home in the exploratory finger. Its owner, cursing horribly, pulled them off one by one and stamped on each in turn. When the queen, enormous and immobile but for her quivering antennæ, was handed to him by the headman of the gang of labourers she met with the same fate.

The Zulu shrugged his bare shoulders. "These white men," he murmured, "who shall understand them? After all this labour, to crush his quarry into nothingness."

"Pour paraffin over them and kill the rest," ordered Bill savagely, nursing his bleeding fingers the while. He belonged to the class that will not learn.

For Cilla, shepherded by Miles, who had missed his clutch at Bill's finger, was making her way, together with a few millions of her kin, along one of the suburban thoroughfares, leading to the confines

of the City and . . . safety. Already a contingent of reserve reproductives had been convoyed along the same route; in the subsequent re-growth of their shattered home it is not unlikely that Cilla attained her ambition and became a mother at last.

For it is in view of such contingencies that provision has been made for the immortality of the Termite race.

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